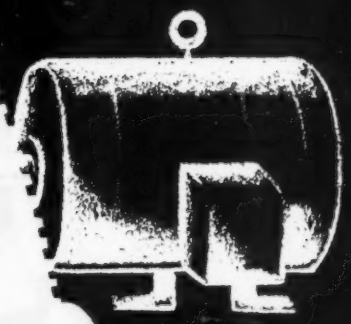
POWER TRANSMISSION DESIGN

Special Report: New Aluminum Bearings

OEM··MAINTENANCE

JANUARY 1960



FIRST IN A SERIES ON **GEARMOTORS**

ALSO IN THIS ISSUE:

Multi-Rib Belt Eliminates Vibration

Clutch and Brake Work Inside Gearbox

Air Clutches Select Speeds Automatically

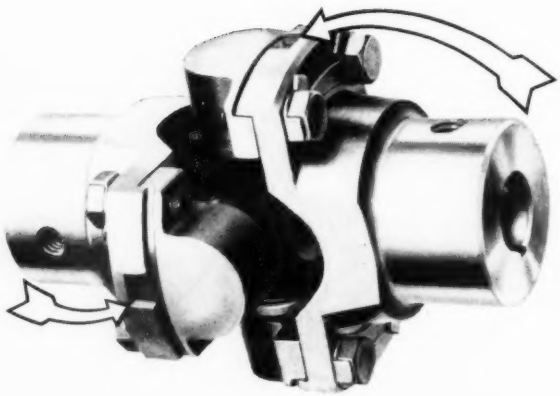
FC FRANCHISED CIRCULATION · DISTILLED WRITING

THE MAGAZINE OF MACHINE DRIVES

News and ideas for designers and plant engineers who use power drive equipment

RUGGED POWER WHEN YOU NEED IT

Because MECHANICS Roller Bearing UNIVERSAL JOINTS drive through KEYS—instead of bolts—they stand up under punishment that shears off other types of fasteners. They are designed with less parts and connections for easy assembly and servicing—smooth running balance—maximum strength with less weight—and long, trouble-free, safe operation. During the winter snows, RUGGED POWER WHEN YOU NEED IT is just one of the advantages you get when you specify MECHANICS Roller Bearing UNIVERSAL JOINTS. Let MECHANICS engineers help you design this and other competitive sales features into your product.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2038 Harrison Ave., Rockford, Ill.

Export Sales: Borg-Warner International
36 So. Wabash, Chicago 3, Illinois

MECHANICS
Roller Bearing
UNIVERSAL JOINTS

B-W

For Cars, Trucks, Tractors, Farm Implements, Road Machinery, Industrial Equipment, Aircraft

For more information circle No. 15 on Reader Service Card.

JAN 18 1960

B 814397

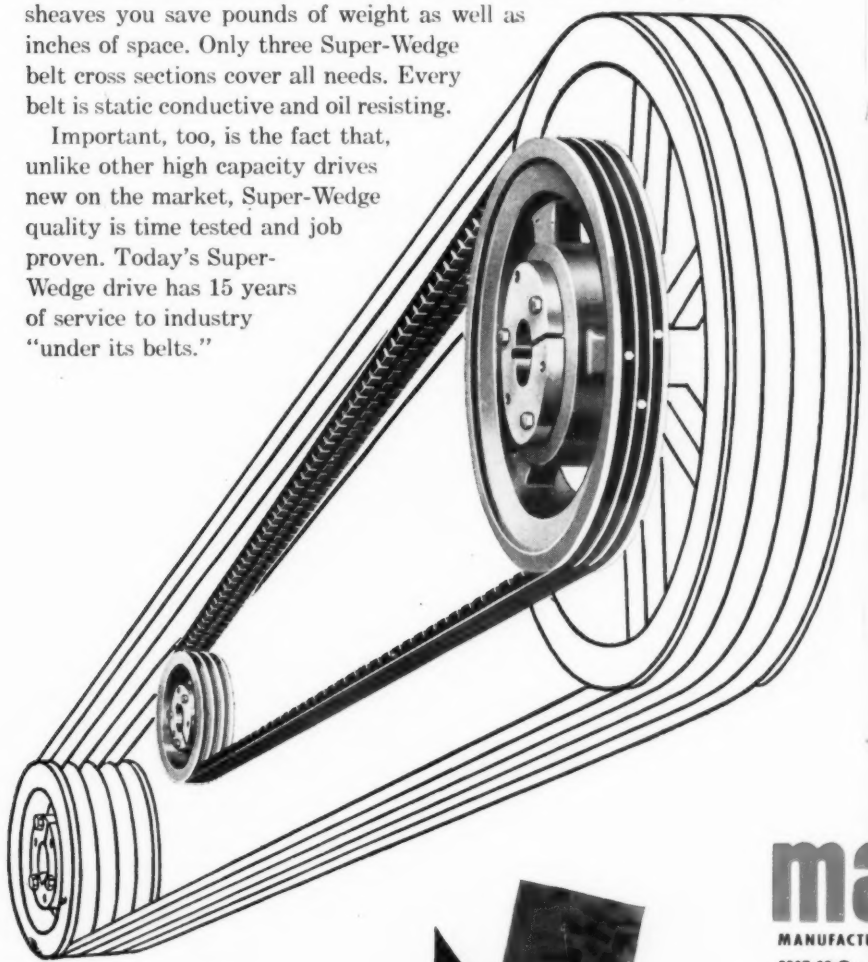
maurey

Super-Wedge V-Drives

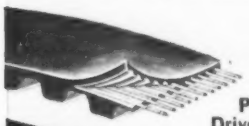
GET BIG DRIVE CAPACITY
INTO SMALL DRIVE SPACE
AND WHIP THE COST, TOO!

When your drive problem is to cut down the space and keep up the power, Super-Wedge is for you. Super-Wedge belts and sheaves are smaller and lighter, centers are shorter, cost is less, and the power capacity is all there. Narrow, limber Super-Wedge belts have tremendous load carrying strength. Controlled stretch keeps them perfectly matched. Their deep side walls contact fully with the narrow grooves of Super-Wedge sheaves to pull with extra power. With narrow, small diameter Super-Wedge sheaves you save pounds of weight as well as inches of space. Only three Super-Wedge belt cross sections cover all needs. Every belt is static conductive and oil resisting.

Important, too, is the fact that, unlike other high capacity drives new on the market, Super-Wedge quality is time tested and job proven. Today's Super-Wedge drive has 15 years of service to industry "under its belts."



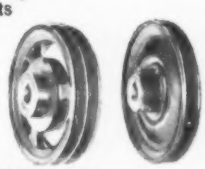
get more **drive**
with Maurey drives



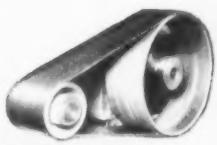
Positive Drive Belts

Variable Speed Belts

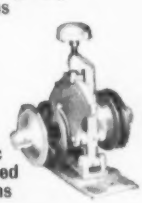
Mor-Grip V-Belts



Hi-Q FHP V-Pulleys



Complete heavy duty V-Belt Drives



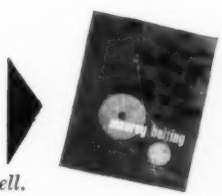
Maureymatic Variable Speed Transmissions

Sprockets

Roller Chains

WRITE FOR CATALOGS

maurey
MANUFACTURING CORPORATION
2907-23 So. Wabash Ave., Chicago 16, Ill.
Phone: DAnube 6-5151



CATALOG B-60 GIVES DETAILS
not only on the Super-Wedge Drive,
but on other proven Maurey quality drives as well.
WRITE FOR YOUR FREE COPY

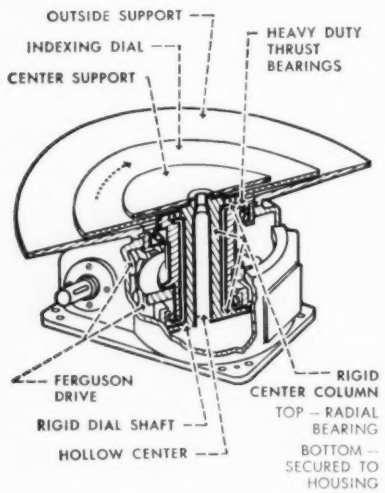
Fast Service from these Maurey Warehouses
CLEVELAND: 3200 Lakeside Avenue • Phone: MAin 1-2242
KANSAS CITY, Mo.: 1728 Walnut • Phone: BAltimore 1-3330

For more information circle No. 26 on Reader Service Card

How INDEX TABLE *DESIGN* Affects INITIAL PRICE and TOTAL COST

Study these drawings to see how the design of an index table affects total costs of an installation. Some tables may be priced lower than others initially, but the additional charges for auxiliary items to adapt them to production requirements, added to maintenance and downtime costs, can make a drastic difference in *the total price*.

FIG. 1—FERGUSON INTERMITTOR



The Ferguson Intermittor, indexed by a roller gear drive which operates a minimum of 8,000 hours at speeds up to 2,000 indexes a minute without maintenance, needs no auxiliary locking. It is designed for high speed operation and incorporates rigid integral supports for tooling to eliminate expensive segmental components. The Intermittor dial is supported by tapered roller thrust bearings to withstand heavy loads with little friction. A stationary center tooling support is held rigidly at its top by anti-friction radial bearings and at the bottom by a flanged base bolted to the housing. Hollow center of the support may be used for passage of coolants, fluids, air or vertical shafts to transmit motion to the work surface.

Figures 2 and 3 show typical barrel cam and geneva drive index tables. Their indexing mechanisms limit operating speeds, therefore other components may be "designed down." Shafts and bearings are lighter; frictional support surfaces might be employed instead of thrust bearings and an auxiliary locking or locating device is a costly necessity for even modest accuracy requirements. Tool mounting methods are often provided at additional expense and sometimes even ignored. Difficulties of installation and frequent maintenance downtime can increase total cost drastically.

FIG. 2—BARREL CAM TYPE

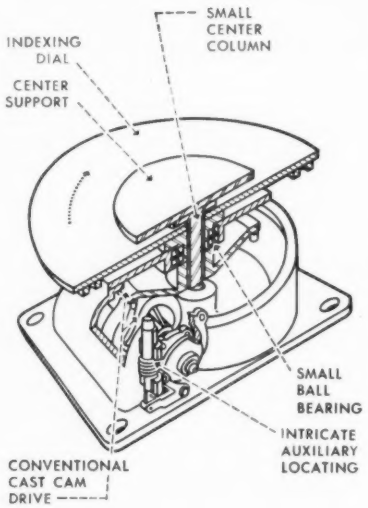
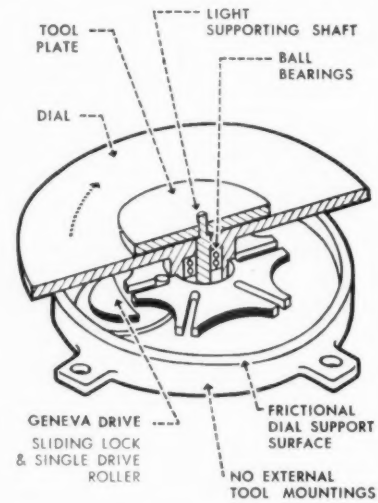


FIG. 3—GENEVA DRIVE TYPE



• SEND FOR CATALOG

Many other advantages result from the selection of a Ferguson Intermittor. Compare designs in new Catalog No. 160 which contains data on more than 175 standard tables. Every design engineer should have a copy. Get yours by writing:

Ferguson Machine Corporation
7818 Maplewood Industrial Court
St. Louis 17, Missouri

For more information circle No. 10 on Reader Service Card.

POWER TRANSMISSION DESIGN

BPA

J. C. SALETTE, JR. .....general manager
DAVID R. CARTWRIGHT .....editor
KEITH A. CARLSON .....managing editor
STANLEY S. GREENE ....technical editor
W. A. WILLIAMS .....consulting editor
HENRY LEFER .....eastern editor
SCHOLER BANGS .....western editor
DR. DAVID KINSLER ....distilled writing
ALARIC MAUSSER .....art director
N. G. KISER .....circulation manager
R. BLACK .....reader service mgr.

FRANCHISE DEPARTMENT

ALAN J. KICHLER .....general manager
F. M. MASON .....representative
REG RATTRAY .....production

SALES OFFICES

Cleveland 15
812 Huron Rd., SU-1-9620
ROSS C. TAYLOR

New York City 17
Rm. 835, 60 E. 42 St., MU 7-3420
LEE HAAS, vice president
W. E. HORENBURGER

Chicago 11
Rm. 704, 520 N. Michigan, WH 3-1655
CHARLES F. GEYER, vice president
ROBERT B. NELSON
SAM TRACY

Los Angeles 57
Rm. 8, Granada Building
672 S. Lafayette Park Pl., DU 7-5104
ALAN T. CAZIER, manager

London, S.W. 1
31 Palace St., Westminster, VI 2608
JOHN A. LANKESTER, manager

POWER TRANSMISSION DESIGN

is published monthly and copyright 1960 by Power Publishing Company, Inc., a subsidiary of The Industrial Publishing Corporation, 812 Huron Rd., Cleveland 15, Ohio.

IRVING B. HEXTER .....president
LESTER P. AURBACH .....executive v. p.
EDWIN M. JOSEPH .....first v. p.
LEE HAAS .....vice president
E. J. HEXTER .....vice president
CHARLES F. GEYER .....vice president
N. N. GOODMAN, JR. .....vice president
PAUL ROLNICK ..... vice president
ALAN J. KICHLER .....asst. sec./treas.

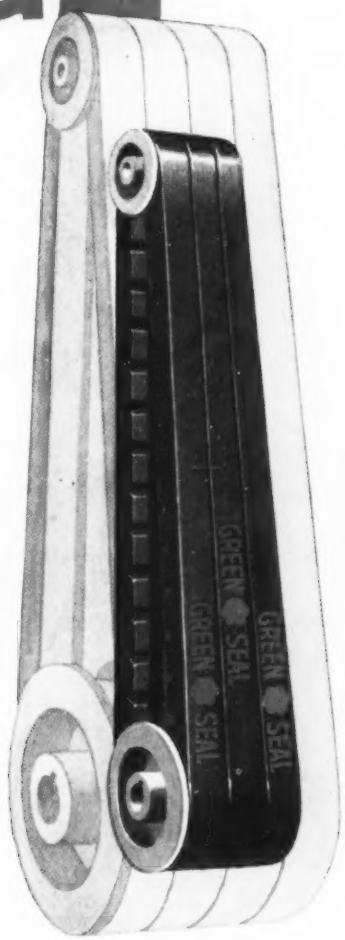
SUBSCRIPTIONS in U. S. and possessions: $7, 1 year; $12, 2 years. Canada: $8 per year. Foreign: $10 per year, payable in advance in U. S. funds. U.K.: £3.50 per year payable in Sterling to London office.

AFFILIATED PUBLICATIONS: Applied Hydraulics & Pneumatics, Welding Design & Fabrication, Material Handling Engineering (formerly Flow), Material Handling Illustrated, Modern Office Procedures, Occupational Hazards, Precision Metal Molding, The Refrigeration & Air-Conditioning Business, Welding Illustrated. Accepted as a controlled circulation publication at Pontiac, Illinois. Return form 3579 to 812 Huron Rd., Cleveland 15, Ohio.

NEW OPENING WEDGE IN YOUR COST-CUTTING CAMPAIGN:

HY-T WEDGE

—a new kind of V-Belt so powerful yet so compact it can cut your drive costs up to 20%



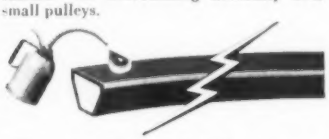
Your V-Belt drive costs have to shrink — with Goodyear quality wedge-type V-Belts like these now at your disposal.

CONVENTIONAL HY-T WEDGE

First place, the completely "fat-free" design and rugged construction of a HY-T WEDGE means you can use fewer belts — on smaller sheaves — with shorter centers — to handle any V-Belt job.

You cash in on famed Green Seal quality. Sinewed with exclusive 3-T Cord, every set of these rugged belts will remain a perfectly matched set even through long storage. On the drive, they outlast anything else you can use.

In the larger sizes, the HY-T WEDGE offers rugged, multiple-ply construction. And smaller sizes are notched—another Goodyear feature — for cool-running flexibility over small pulleys.



Still another Goodyear "plus" — every one of the 46 HY-T WEDGE V-Belts is oil-resistant and static conducting. And you don't pay one cent extra for this extra protection.

And remember—these great, new HY-T WEDGE V-Belts are a development of Goodyear—pioneer of the original "wedge" design more than 10 years ago. They incorporate all the advances Goodyear has uncovered in turning out thousands of specialized "wedge" belts for specialized purposes.

For the complete story, check with the G.T.M.—Goodyear Technical Man—through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Lincoln 2, Neb., or Akron 16, Ohio.

HY-T WEDGE with the GREEN SEAL BY

GOODYEAR

THE GREATEST NAME IN RUBBER

HY-T WEDGE, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

For more information circle No. 35 on Reader Service Card

JANUARY 1960

volume 2 number 1

POWER TRANSMISSION DESIGN

THE MAGAZINE OF MACHINE DRIVES

FRANCHISE CIRCULATION fc

DISTRIBUTED BY CDM

FEATURES

PUT YOUR POWER WHERE THE WORK IS—WITH A GEARMOTOR 20

IDEAS

MULTI-RIB BELT ELIMINATES VIBRATION 39

EDDY-CURRENT COUPLINGS KEEP CABLE TENSION CONSTANT 40

CYLINDER ACTUATES CLUTCH AND BRAKE INSIDE GEAR BOX 42

SPEED REDUCER UPS EFFICIENCY TO 97% 43

ELECTRIC CONTROLLED AIR CLUTCHES SELECT SPEEDS AUTOMATICALLY 44

DIESEL ENGINE IMPROVES GROUND POWER UNIT 46

HYDRAULIC DRIVES SIMULATE ROAD LOADS 48

BEARING SECTION

NEW ALUMINUM SLEEVE BEARINGS—FOR HIGH LOADS AND SPEEDS 56

REFERENCE FILE

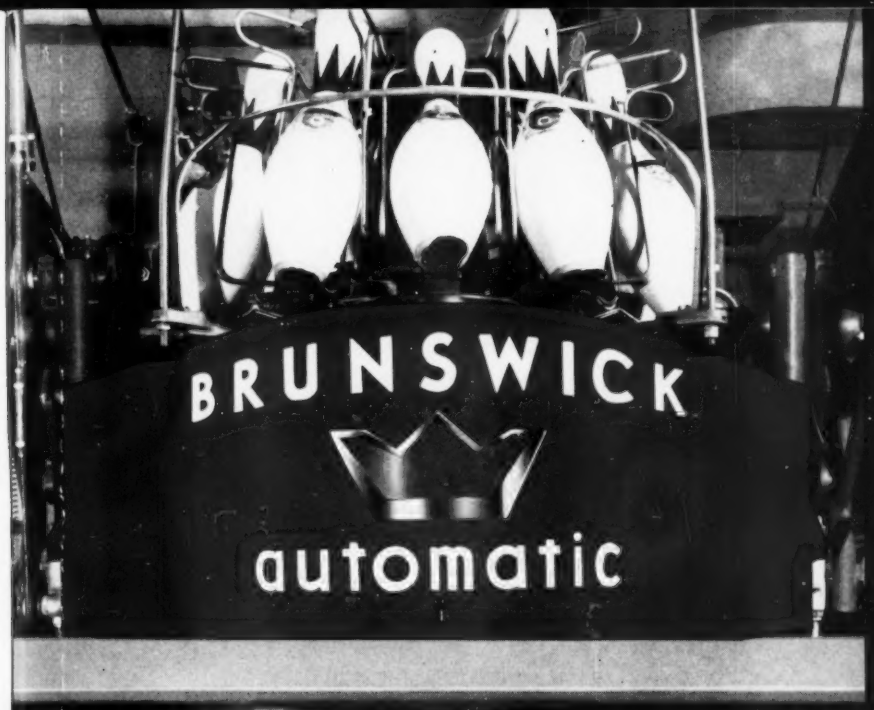
NOMOGRAM OF SHAFT TORQUE, HP AND RPM 62

DEPARTMENTS

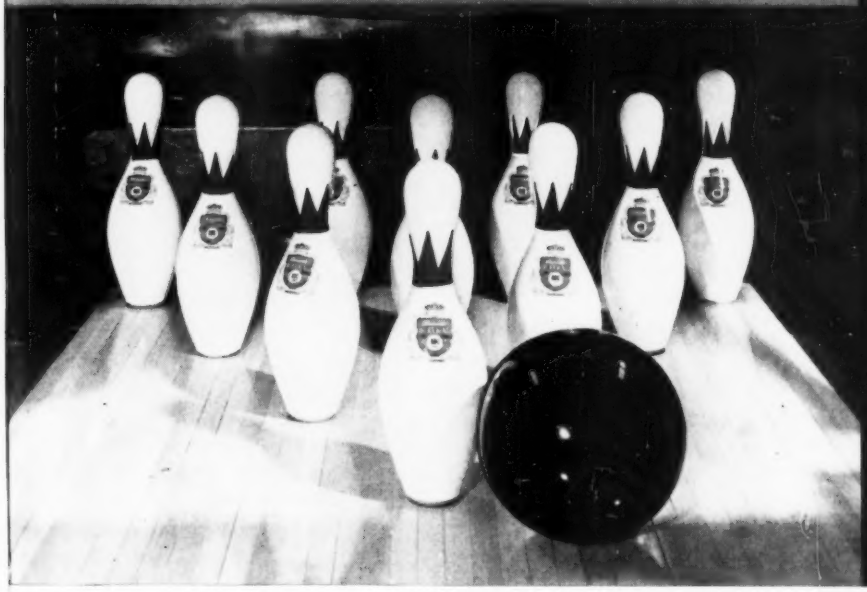
EDITOR'S PAGE 6
LETTERS 8
MEN 10
NEWS 12
NEW PRODUCTS * 30
LITERATURE * 50
NOMOGRAM 62
ADVERTISERS' INDEX 64
READER SERVICE CARD INDEX 65

Before going further, tear out a Reader Service Card which you will find opposite page 66. Fill it out as you read and mail it when you're done. We'll act on your requests immediately.

Circle No. 9 on Reader Service Card ⟶



Symbol of Quality to..



23,000,000 BOWLERS!

(and good healthful fun!)

The "baby split" has become as much a part of the language as the "banana split", and a "railroad" no longer merely describes a means of conveyance from one point to another.

To the 23,000,000 Americans who actively bowl—and to additional millions who watch the sport on television—they represent part of the terminology of the nation's fastest-growing sport.

And to millions of Americans the name "Brunswick" is synonomous with enjoyment of this indoor sport which draws no lines of sex, age or position in life.

As the nation's oldest and best-known bowling equipment firm, the Brunswick-Balke-Collender Company supplies millions of enthusiastic bowlers and thousands of spic-and-span bowling lanes with such necessary items as bowling balls, shoes, pins, scoring systems and other products.

But perhaps the most dramatic of the Brunswick products is its Automatic Pinsetter. A marvel of mechanization and of ingenuity in design, it must function steadily and accurately game after game, night after night, week after week. There can be no breakdown or delay.

The Brunswick people have set up rigid standards for the material they use in their Automatic Pinsetter. This maintenance of quality and precision in all phases of manufacturing, this industry leadership, have made the name Brunswick a symbol of dependability.

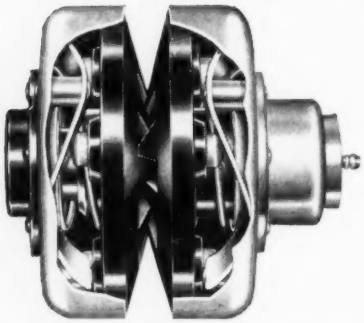
DURKEE-ATWOOD V-Belts are an integral part of the Brunswick Automatic Pinsetters, which have been such a boon to bowling. They were selected because of their proven ability to give long and consistent service under the most difficult and demanding conditions. If you have a V-Belt problem that requires special attention and service, call your Durkee-Atwood distributor or write Durkee-Atwood Company, Minneapolis 13, Minnesota.

Look for the DA *on your V-Belts*

DURKEE-ATWOOD V-BELTS

DURKEE-ATWOOD COMPANY • MINNEAPOLIS 13, MINNESOTA

Hi-Lo Load-O-Matic Control Eliminates Pulley Slow Down



Hi-Lo Variable Speed Pulleys positively maintain the desired speed ratio over a wide range of load variation by means of an exclusive cam and cam follower assembly. This means:

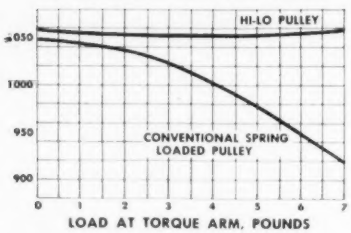
Pulley speed is independent of load and load changes. "Drag" is eliminated and high shock absorbency provided.

Pulleys do not compress belt due to spring pressure. Springs are not driving members. They act only to keep pulley faces in contact with belt.

Pulleys automatically regulate belt tension. Because of the cam assembly, belt is never under more tension than required by the load.

Double cams maintain constant belt alignment.

HI-LO PULLEYS COMPARED TO OTHER VARIABLE SPEED PULLEYS



PLUS THESE OTHER FEATURES:

- Smaller in size than comparable units.
- Quickly and easily installed.
- Replaceable face assemblies drastically cut repair and replacement costs.
- Available in sizes from .5 to 5 hp., ratios to 2.5/1 (single pulley) 6.25/1 (double pulley).

Request details and prices. Ask for Bulletin A-458.

Manufactured By HI-LO MANUFACTURING COMPANY

Nationally Distributed By LOVEJOY FLEXIBLE COUPLING COMPANY 4991-H W. Lake St. Chicago 44, Ill.

Circle No. 44 on Reader Service Card

EDITOR'S PAGE

David R. Cartwright
editor

WITH THIS, OUR FIRST ANNIVERSARY . . .

. . . issue, we leap into the second year of POWER TRANSMISSION DESIGN with new programs and new objectives. We have outlined what we hope you consider a good program, with many special articles and important reader surveys. If you would like a copy of the program as we have it outlined, drop us a note and we'll be glad to send it to you without delay.

Much has happened to us in the past year and most of it has been good. In all, we owe you much thanks. Your grasp and quick acceptance of this magazine has been very good.

In a year-end survey, almost 60% of you claimed that POWER TRANSMISSION DESIGN is now your No. 1 magazine for news and details in this field. Most others of you polled mentioned it second or third in deference to several other old-line magazines.

Requests for reprints of articles and reference nomograms have been so large that we now over-print our entire magazine in loose form so that our reader service department has its 'own' copies to dismember and send you.

Those of you who have requested reprints of our larger, special, product articles have noticed that they are especially reprinted in attractive booklet form. If you haven't been assembling these into your reference library as we suggested in our August '59 issue, it's not too late. Drop us a note; we'll send you past copies to get you up to date.

YOUR READER SERVICE CARD . . .

. . . is what counts in all of this, more than anything else, in the measure of success of this magazine. Always tear a card out when you first open the magazine and fill it out as you go.

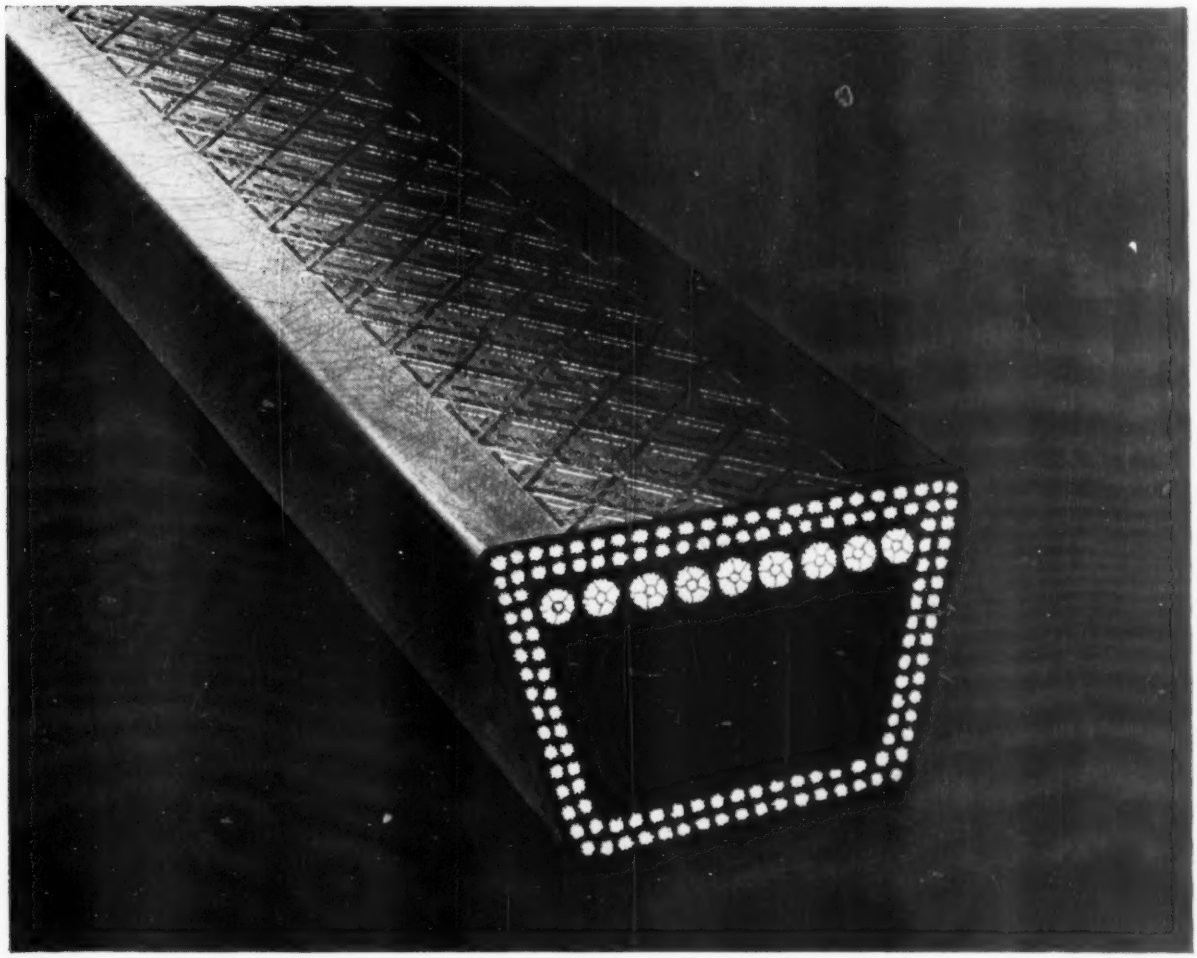
Circle everything that interests you and send it in to us. This is YOUR No. 1 way to help us build a better magazine.

Dave Cartwright

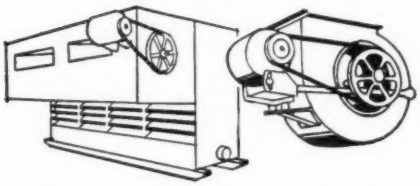
Editor.

AUTO AIRCON STEEL CABLE V-BELTS
from the Power Unlimited complete belt line

Patented curing method keeps all the steel pulling members in the same plane. They remain straight, are never wavy.



Quiet...smooth... vibration at the vanishing point



For silent and efficient operation of fans, pumps, compressors, blowers —for best power transmission in air-conditioning and refrigeration units —specify U. S. Auto AirCon Steel Cable V-Belts. These belts have everything required in a belt for air-conditioning use. They are in a class by themselves. Forget your negative experiences with other V-belts. U. S. Auto AirCon V-Belts have pulling cords of steel. A new, patented curing method and electronic tensioning of the steel cords *free this belt from vibration.* Power is transmitted smoothly, quietly, efficiently. It has been proven in rugged, automotive air-conditioning service. This belt has outlasted other belts up to 2½ times longer.

Our transmission engineers stand ready to consult with you on any and all transmission belt problems. Drop us a line at the address below.

• • •

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N. Y. In Canada: Dominion Rubber Company, Ltd.

For more information circle No. 43 on Reader Service Card

whatever your

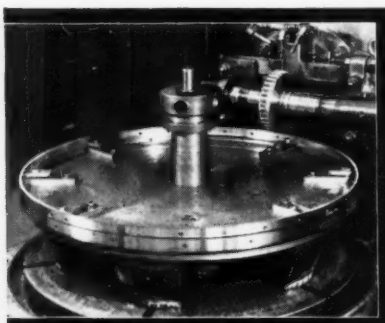
Gear Problem...

it will pay you to bring it to us

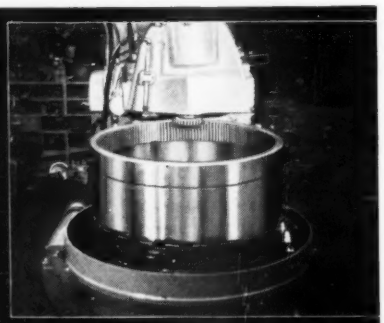
● BRAD FOOTE has the finest cutting and shaping equipment available for producing the widest possible variety of precision gears.

● Our heat-treating facilities are second to none. From blanks to the finished precision gears... BRAD FOOTE takes the job all the way. There is no division of responsibility.

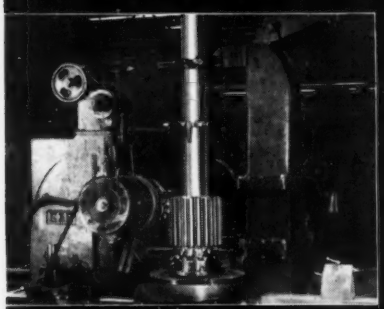
● Whatever your gear-cutting needs... racks, speed reducers, transmissions or intricate power units... BRAD FOOTE fills all your requirements from one source. Let our engineers consult on your requirements. There is no obligation. It may save you time and money.



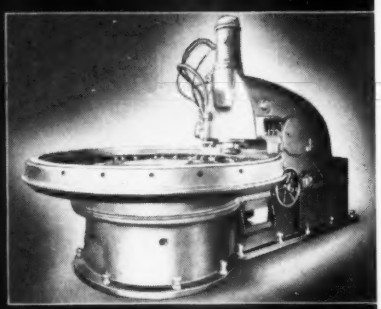
Medium-sized hobbing machine cutting teeth in special crown gears



Special precision 154" gear shaper cutting internal gear for use in large wind tunnel



Large hobbing machine cutting teeth of large pinion on 12 foot shaft



Large special 154" gear shaper cutting large spur internal ring gear for radar equipment

BRAD FOOTE GEAR WORKS, INC.

MEMBER OF AGMA

1313 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700

subsidiary • **PITTSBURGH GEAR COMPANY**, Neville Island • Pittsburgh 25, Pa., Phone: SPaulding 1-4600

For more information circle No. 3 on Reader Service Card

LETTERS

Address letters to:
The Editor
Power Transmission Design
812 Huron Road, Cleveland 15, Ohio

Suggestions

Gentlemen:

In your September issue (Figure 3, Page 61) you use terminology for gearing that does not conform with AGMA 112:03 and ASA B6.10-1954 standard gear nomenclature.

I would think that in your excellent magazine you would be unusually careful in the nomenclature of standard transmission components, even though you receive articles from many sources. I cite the following preferred terms, with the terms you used in parenthesis:

- Parallel helical gears (helical spur set).
- Spur pinion and internal gear (external pinion with internal gear).
- Spur planetary gears (planetary gear set).
- Double-enveloping wormgearing (worm set).
- Crossed helical gears (external gear set).

G. DAVENPORT, Chairman
AGMA Nomenclature Committee &
Subcommittee on Nomenclature, B6
Norton Co.
Worcester, Mass.

You be the author

Gentlemen:

I am preparing a technical article which would be of interest to gear train designers. It offers an analytical approach to a problem that is commonly solved by trial-and-error methods.

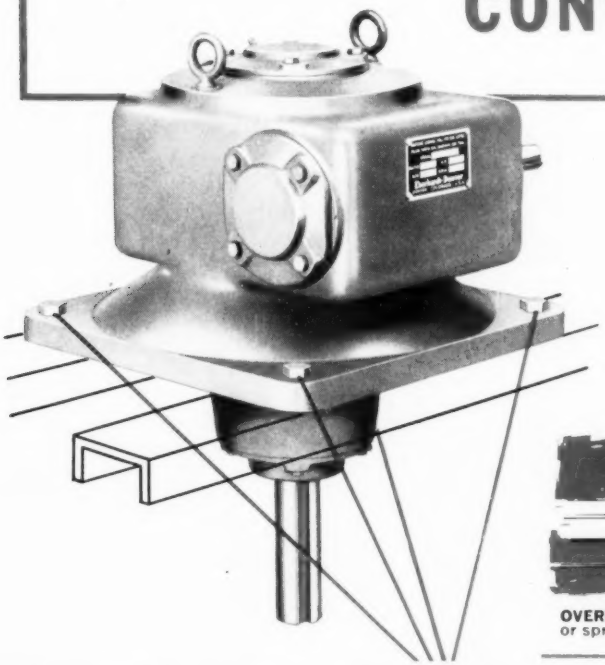
The problem is how to determine the numbers of teeth in a concentric gear train. They usually fall into two categories: planetary trains, in which one annular gear is used; countershaft trains, in which all gears are spur, with input and output gears concentric.

If you think your readers would find this of interest, I shall be pleased to send you a draft of the article.

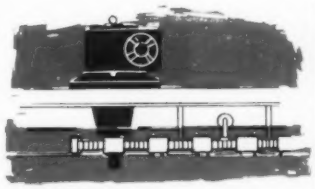
CARL S. NEWMAN, P. E.
Rockville Centre, L.I., N.Y.

FAST off-the-shelf delivery

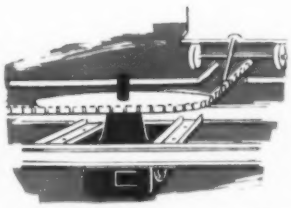
MORSE EBERHARDT-DENVER CONVEYOR DRIVES



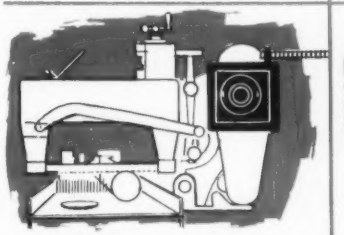
★ No design limitation . . . up, down, or 90° mounting ★ one-piece alloy cast iron housing ★ high torque capacity ★ single or double reduction gears ★ input ratings from .41 hp to 15.82 hp—from stock at low factory prices



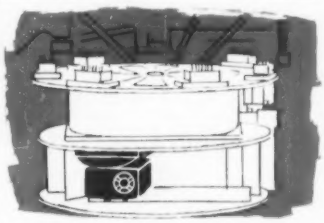
OVERHEAD . . . typical caterpillar or sprocket drives



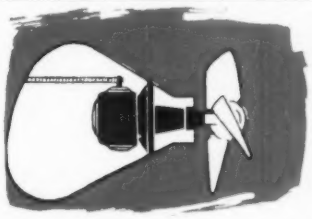
SUB-FLOOR . . . for towline or special equipment



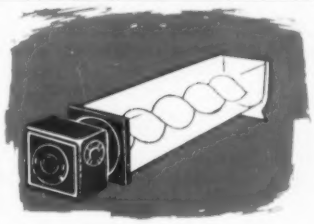
90° MOUNTING . . . for heavy-duty metal saws and machines



VERTICAL . . . base mounting for power turntable machines



SIDE MOUNTED . . . paint, pulp, liquid, or chemical agitators



HORIZONTAL . . . screw conveyors, straight or angular mounts . . . and scores of standard or special uses.

Easy-mount design . . . only 4 bolts

Morse E-D speed reducers lead in limitless applications with utmost ease in mounting. The 4 holes form a perfect square concentric to the driveshaft. Unlike most designs, they deliver high torque at the end of the output shaft supported by sturdy anti-friction bearings in the extended housing. Mounting versatility with the unit's cast-in base makes Morse drives adaptable to conveyors of all types, agitators, screw conveyors, machines, and for any other transmission of power where dependable speed reduction is specified.

In many cases you'll find Morse "standard" drives ready for immediate delivery . . . often eliminate the problems of "specials." Check with your Morse distributor, he's listed in the Yellow Pages under "Power Transmission," or write Morse Chain Company, Dept. 27-10, Ithaca, N.Y. for illustrated catalogs. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ontario.

MORSE B-W

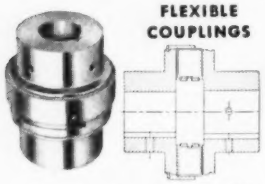
A BORG-WARNER INDUSTRY

For more information circle No. 36 on Reader Service Card

LOVEJOY
POWER TRANSMISSION EQUIPMENT

EASILY INSTALLED, MAINTENANCE-FREE

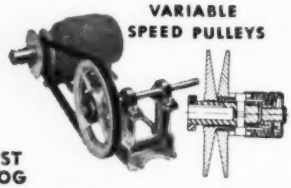
FLEXIBLE COUPLINGS



REQUEST CATALOG C-58

Bores (max). .....⅛" to 9½"
O. D. .....⅝" to 21½"
Wt. .....½ oz. to 1500 lb.
H. P. .....1/20 to 4250

VARIABLE SPEED PULLEYS



REQUEST CATALOG P-58

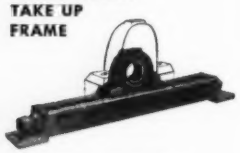
Bores (max.) ..... ½" to 1⅞"
O.D. .....3" to 13⅜"
Belt Sizes.....A to 2¾ TW
Speed Ratios.....1-1 to 8-1
H.P. (1750 rpm.).....¼ to 15

UNIVERSAL JOINTS

REQUEST BULLETIN 820

Bores.....¼" to 2"
Hub Dia. .....½" to 4"
Static Torque 340 to 130700 in.-lbs.
H.P. (100 rpm.).....½ to 207

VERSA-MOUNT TAKE UP FRAME



REQUEST BULLETIN V-647

For All Pillow Blocks—Ball, Roller or Babbitted
Mount Top, Side, Inverted or Reverse-foot
Sizes ....½" to 2-7/16" Blocks
Travel lengths ..... 2" to 36"

Write for above literature today.

LOVEJOY FLEXIBLE COUPLING CO.

4852 West Lake Street, Chicago 44, Illinois
Circle No. 14 on Reader Service Card

MEN *of the power transmission industry*

Bos heads Grayhill's distributor sales

LAGRANGE, ILL.—Grayhill, Inc., has named Robert A. Bos distributor sales manager. Bos will concentrate his efforts in the field, working directly with the firm's distributors and their sales organizations.

BOS

His association is expected to greatly further Grayhill's Industrial Distributor Program and sales of miniature and sub-miniature electrical and electronic components, including rotary, concentric shaft, and push button switches, binding posts, test clips, test jacks, transistor and pencil tube sockets, diode holders, etc.

Upton is board chairman at New York Rubber

BEACON, N. Y.—Edward W. Upton, a director of New York Rubber Corp. since 1957, has been elected chairman of the board of directors and chief executive officer. He formerly was executive vice president of the Refinery Engineering Co., Tulsa.

Alcoa promotes two

PITTSBURGH, PA.—Aluminum Co. of America has appointed two additional assistant chief power engineers, G. A. Eagleton and H. H. Gnuse, Jr. They will continue their responsibilities in directing the work of the hydraulic engineering and electrical engineering sections, respectively, of the power engineering division. Both formerly were senior power engineers.

Leece-Neville names two officers

CLEVELAND, OHIO—At Leece-Neville Co., Albert F. Goodrich has been appointed comptroller, and George B. Howell appointed vice president of manufacturing for all divisions.

Goodrich has been comptroller and treasurer of the Ramset Fastening System Div., Olin Mathieson Chemical Corp.; Howell formerly was manager of General Electric's Fort Wayne Hermetic Motor operations.

Chain Belt appoints works manager

MILWAUKEE, WIS.—Chain Belt Co. has named Kenworthy J. Thompson works manager of its plant in Milwaukee county. Thompson will be responsible for manufacturing and production in the firm's chain and transmission division, heavy machinery division, and foundries. He'll also be responsible for the operations of the methods and tool design, Milwaukee personnel, and Milwaukee maintenance departments.

Colebrook promoted at National Supply

PITTSBURGH, PA.—Ross W. Colebrook has been named chief engineer, hydraulic drives, for The National Supply Co. He'll be responsible for production designs of hydraulic couplings and torque converters.

Colebrook, who joined National Supply in 1948, has served in the general engineering department at Toledo and Pittsburgh, and as a development engineer at Houston. He returned to Pittsburgh a year ago as senior development engineer.

Beesley on board of U. S. Rubber

NEW YORK, N. Y.—Eugene N. Beesley, president and board member of Eli Lilly and Co., has been elected to the board of directors of U. S. Rubber Co. Beesley joined Lilly in 1929,

Formsprag names application engineer

DETROIT, MICH.—Richard A. Lee has joined Formsprag Co. as application engineer. Lee was acting manager of the Rawson Centrifugal Clutch Div. of the O. S. Walker Co. before its purchase by Formsprag. He will work with customers in adapting the Rawson centrifugal clutch to the products they manufacture.

LEE

Lee, who started with the Rawson Div. as design engineer, was product engineer in charge of clutch production when he took over duties of acting divisional manager.

NLGI appoints Brunstrum technical chairman

KANSAS CITY, MO.—L. C. Brunstrum, section leader in charge of research on greases and industrial lubricants for Standard Oil (Indiana), has been named Technical Committee chairman of the National Lubricating Grease Institute. He succeeds T. G. Roehner of Socony Mobil Oil, who is leaving the post after 12 years because of a change of responsibilities.

Brunstrum will direct and coordinate 10 sub-committees and study groups on intra-industry technical problems, along with NLGI-sponsored research and liaison with other societies.

Dayton Rubber's Opper fills engineering post

DAYTON, OHIO—Lincoln I. Opper has been named manager of product engineering for The Dayton Rubber Co.'s Dayflex Plastic Hose Div. The position was created by rapid expansion of the Dayflex hose line in recent years.

Opper, formerly a belt engineer with Dayton Rubber's Industrial Div., will act as liaison between sales and production. His duties will include design and engineering or special product developments.

Hewitt-Robins names manager of patents

STAMFORD, CONN.—John L. Shortley has been appointed manager of the patent department of Hewitt-Robins, Inc. He formerly was manager of the Washington office of the patent law firm of Munn, Liddy, Daniels and March.

U. S. Rubber's Hugger promoted in research

WAYNE, N. J.—Richard H. Hugger has been promoted to senior department manager at U. S. Rubber Co.'s Research Center. Since he joined the company in 1947, Hugger has worked in the mechanical engineering research department, becoming department manager in 1958.

As senior department manager, he'll have greater responsibility for the direction of the technical activities of the department.

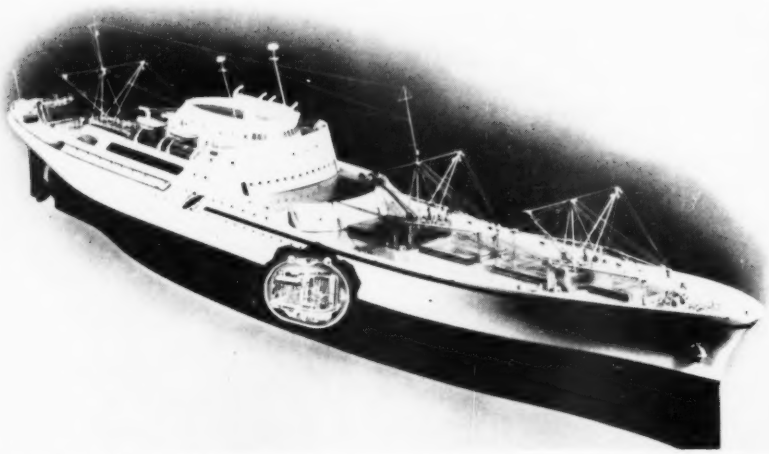
Oilgear opens new district office

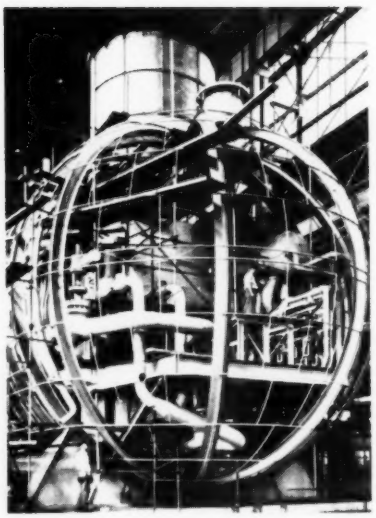
MILWAUKEE, WIS.—The Oilgear Co. has opened a sales, service, and engineering office in Houston, at 4402 Richmond Ave. The new district covers Texas, Oklahoma, Arkansas, Louisiana, Mississippi, western Alabama, and Tennessee.

HEALY

Thomas M. Healy, who helped cover this area out of Milwaukee, will be in charge. He's been a sales and service engineer since 1953.

Servospeed
HEART OF AUTOMATION
MODERN ELECTRONIC ENGINEERING GIVES PRECISE MOTOR SPEED CONTROL
1/100 — 10 H. P.
Modern industrial electronic engineering has been coordinated with electric motor design to provide a versatile means for obtaining the full possible advantage of speed control in DC motors while operated from the regular alternating current power line. Grid controlled "Thyratron" tubes are utilized for power controlled stepless variation to supply motor armature power. Patented feedback, or "Servo" circuits provide constant torque capability over wide speed ranges of as high as 60 to 1 in some models and a minimum of 20 to 1 in others.
Servospeed
DIV. of ELECTRO DEVICES, Inc.
4 Godwin Ave., Paterson, N. J.
ARmory 4-8989
Circle No. 19 on Reader Service Card





N. S. SAVANNAH with cutaway showing location of nuclear power plant. Mock-up of the plant (right) is a full scale model 70 ft. long and 55 ft. high.

Nuclear-powered Savannah cruises 300,000 miles non-stop

CAMDEN, N. J.—The world's first nuclear-powered merchant ship, the Savannah, will have one of the most advanced, yet conservatively-designed power plants in existence. This is the same type of pressurized water reactor in the USS Nautilus.

The Atomic Energy Commission awarded the prime contract for design and manufacture of the Savannah's nuclear power plant to The Babcock and Wilcox Co. B&W also is supervising the installation and will participate in the testing of the entire power plant. The steam turbines and reduction gear were subcontracted to the De Laval Steam Turbine Co. The vessel is now under construction at New York Shipbuilding Corp.

The Savannah's vital statistics are: passenger accommodations for 60, cargo capacity for 10,000 tons, normal cruising speed of 21 knots, normal cruising range of over 300,000 miles and 3½ years on one fuel loading, 587 ft. long, 78 ft. beam, 29½ ft. draft. It will be operated by States Marine Lines.

The nuclear propulsion system consists of reactor system and a steam propulsion system. Most of the reactor system, including the reactor with its primary loops, pressurizer, steam generators, primary circulating pumps, air conditioning system, and other auxiliary systems, will be enclosed in a cylindrical containment vessel. Certain low pressure reactor system auxiliaries, such as the primary water demineralizers, charge pumps, drain tanks, and a few other components, are located just outside the containment vessel.

The steam propulsion system comprises the main turbines and reduction gear, the main condensers, the feed water sytem, the turbine generators to supply propulsion auxiliaries and ship's "hotel" load, and the emergency diesel generators and package boiler to supply emergency needs.

Main sources of radiation during operation of the power plant are the reactor itself and the primary loop coolant water. A shield serves the dual purpose of limiting the radiation dose outside the containment to prescribed safe levels, and permitting access to the interior of the containment vessel within 30 minutes after shutdown.

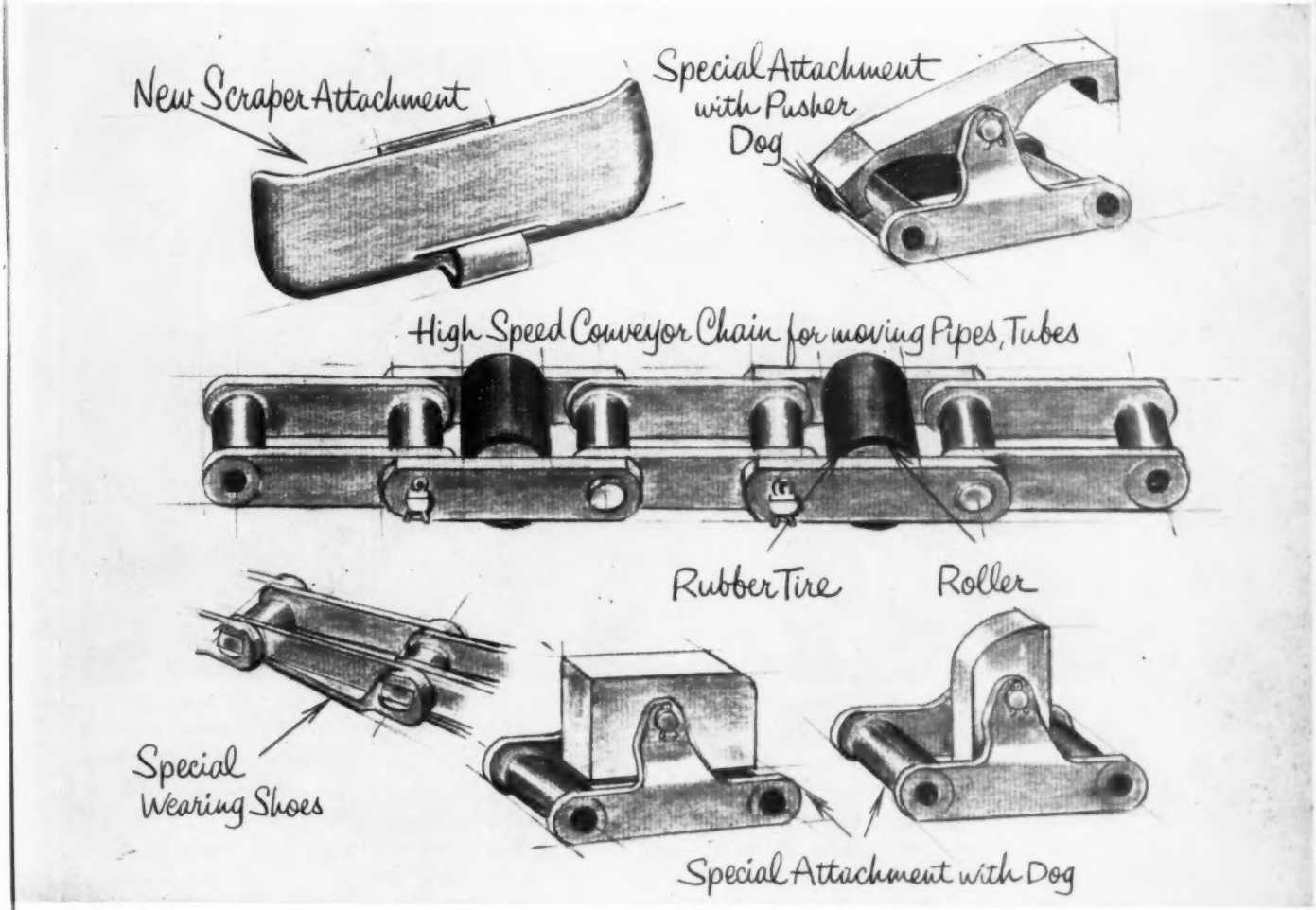
So, the shield was divided into a primary shield, which surrounds the reactor, and a secondary shield which surrounds the containment vessel. The primary shield consists of a water-filled tank surrounding the reactor, augmented by an outer lead annulus varying in thickness from 2 to 4 inches.

The secondary shield consists of lead, polyethylene, concrete, and water thick enough to reduce reactor and coolant doses to allowable levels. This secondary shield weighs about 2000 tons. A concrete wall, which encloses the lower part of the containment vessel, makes up the lower portion of the secondary shield.

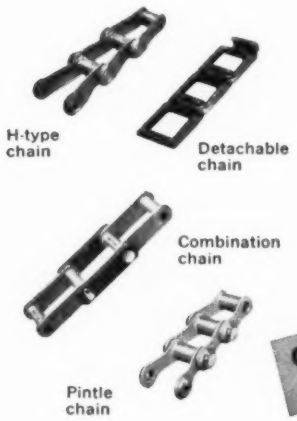
Special ball thrust bearings designed and manufactured by The Kaydon Engineering Corp. will be used to install the fuel elements in the nuclear reactors. Two bearings (106 in. and 64 in. diameter) will be installed in the "charging plug" which rotates in order to locate the refueling cask in the various positions necessary to load the fuel core.

Stymied by "Standards"

in malleable chains and attachments?


New Scraper Attachment
Special Attachment with Pusher Dog
High Speed Conveyor Chain for moving Pipes, Tubes
Rubber Tire Roller
Special Wearing Shoes
Special Attachment with Dog

Moline makes "specials" for OEMs



Take advantage of two new Moline services which can help you solve design problems.

First...send for the new, comprehensive *Moline Conveyor Chain Manual and Design Engineer's Handbook* which shows all types and sizes of standard chains and lists dozens of attachment combinations with details on application and performance. Everything is included to help you "spark" new ideas for improving and modernizing your equipment.

Second...ask for *Moline's special design service* to help you when there is no "standard" chain or attachment to meet your job requirements. Moline field engineers will be glad to work with you to develop exactly the right chain and attachment combination to meet your OEM service needs.

Write today for the new Moline Manual and Handbook or call for a Moline field engineer now to help on your design problem. There's no obligation!

Chain specialists for 60 years

Moline Chains

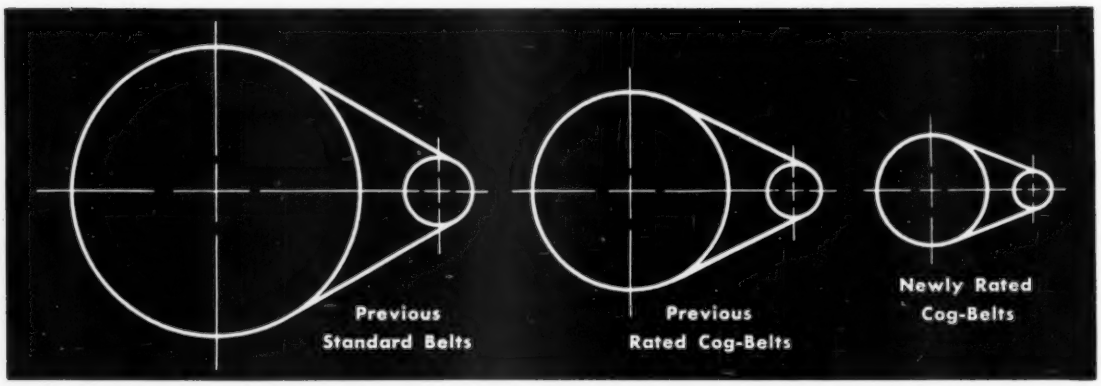
MOLINE MALLEABLE IRON COMPANY
St. Charles, Illinois

For more information circle No. 16 on Reader Service Card

AN IMPORTANT ANNOUNCEMENT FROM HEADQUARTERS FOR **NEW** IDEAS

Now Dayton Cog-Belt® increased to 200%–300% of

Higher HP Dayton Cog-Belts offer today's biggest savings in Cost,



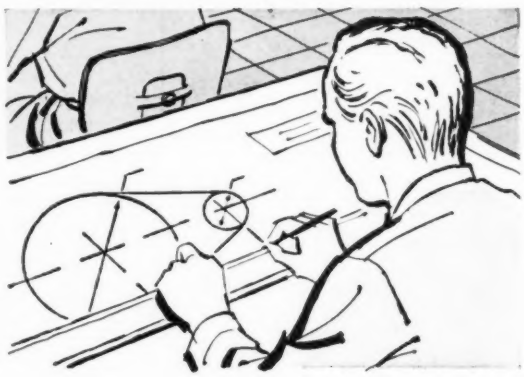
The Dayton Rubber Company proudly announces the findings of the most extensive, thorough analysis project in the V-Belt power transmission field, during which literally hundreds of thousands of V-Belt drives were evaluated by a renowned, independent engineering laboratory.

This long-term project was initiated because Dayton Cog-Belt performance had been noticeably upgraded over a period of years, through continued research and development in new materials and improved features . . . indicating that heretofore established HP ratings have become obsolete.

The result: Important new increases in Dayton Cog-Belt horsepower ratings . . . *now 2 to 3 times higher than previous standard V-Belt ratings.*

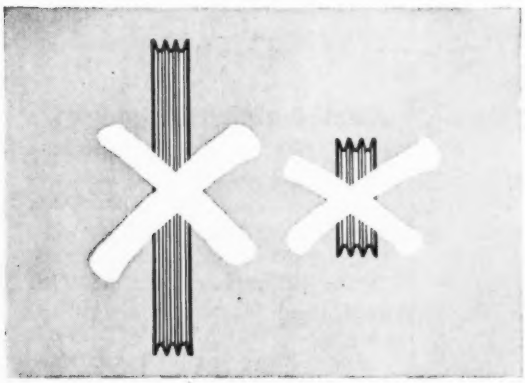
For the V-Belt drive designer . . . New Compactness, Lightness, Economy.

Dayton Cog-Belts, delivering 2 to 3 times more horsepower, permit drive designers to use narrower sheaves, less grooves, fewer belts for any V-Belt drive. *Two Cog-Belts do the work of 4 to 6 previous standard V-Belts.* Drive space thus saved permits new compactness of design, lighter weight and lower cost . . . job-proven on thousands of power drives throughout all industry. First costs and maintenance costs can be substantially reduced with Dayton Cog-Belt drives.



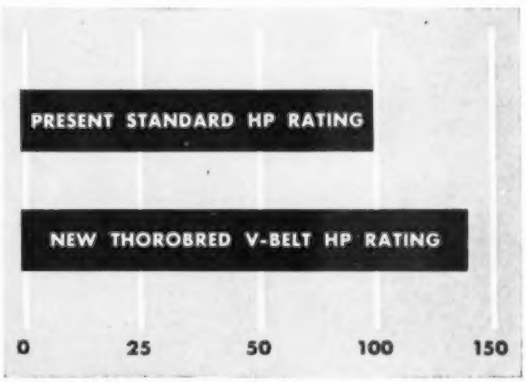
Horsepower Capacity previous Standard Belt Ratings

Drive Space, Weight . . . using *existing industry-standard sheaves.*



No special sheaves required... Existing sheave stocks usable.

Using long-accepted industry-standard sheaves, *Dayton Cog-Belts do not obsolete present stocks of sheaves* . . . drives can be assembled from any existing inventories. Newly-rated Dayton Cog-Belts permit use of sheaves with smaller diameters and comparably closer centers . . . always at a savings in cost and weight. Because Dayton Cog-Belts operate on industry-standard sheaves, there is no need to stock additional special sizes. Present inventory stocks allow you to cover a greater range of higher horsepower capacities.



HP Ratings on Dayton Thorobred V-Belts also substantially increased.

Dayton Thorobred V-Belts, through similarly evolved improvements in materials and research, are now also officially increased in horsepower capacity—40% more than previous standard ratings. Five Dayton Thorobreds now do the work of seven standard-rated V-Belts. Here again are important increases in power drive capabilities and cost reductions! With these new ratings, the Dayton Thorobred is unquestionably the leading performer of all standard-type industrial V-Belts.

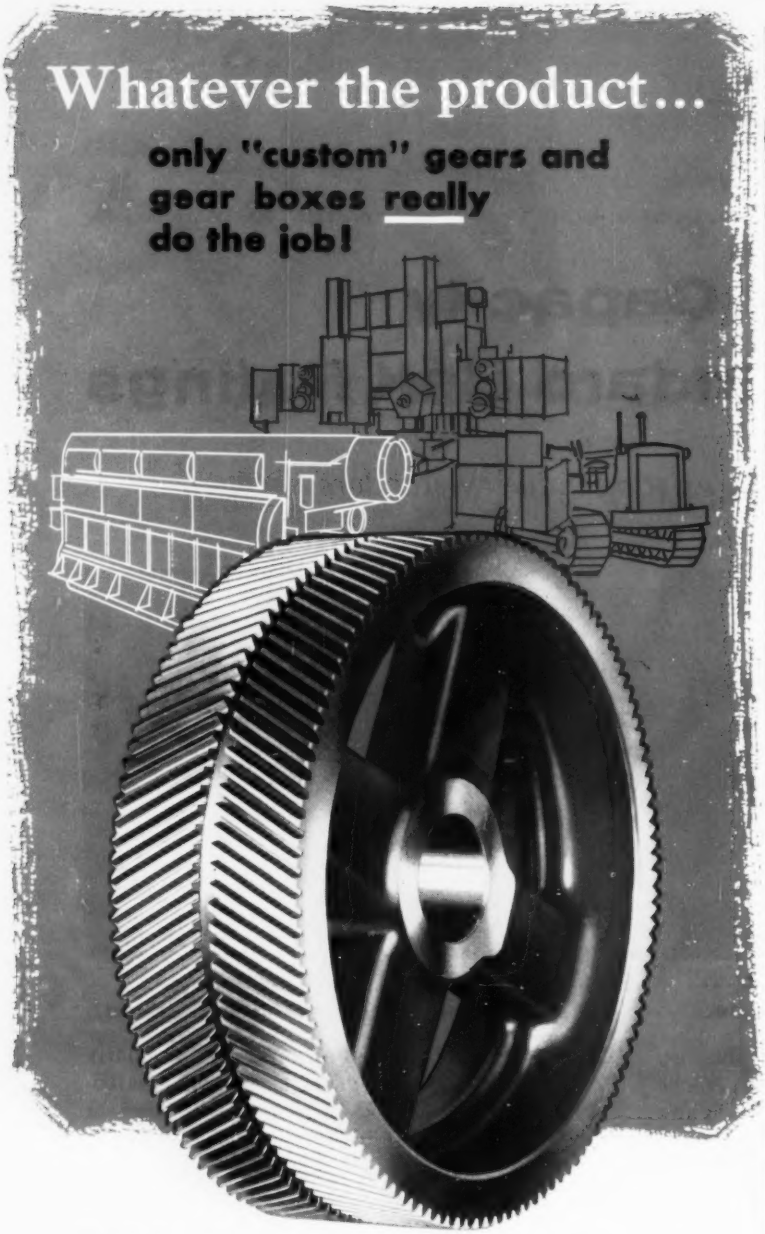
Write for new brochure showing how designers can calculate Dayton Cog-Belt drives by referring to existing drive selection tables in Dayton's #280-B Handbook of V-Belt Drive Design. See "Belting" in the yellow pages of your telephone directory for the name of your nearest Dayton Distributor or write Dayton Industrial Products Company, Division of The Dayton Rubber Company, Dayton 1, Ohio.

Utilize over 30 years of time proven Dayton quality, research and engineering in your V-Belt drive design.

Dayton Industrial Products Co.

Melrose Park, Ill. *A Division of The Dayton Rubber Co.*

For more information circle No. 34 on Reader Service Card



Don't let adaptation and compromise determine your gearing specifications. Custom-made gears and gear boxes from Cincinnati Gear are competitively priced—yet, they afford the design engineer full freedom to incorporate the exact transmission components he requires to suit his specific need.

Send us your prints for quotation.

CINTI®

THE CINCINNATI GEAR CO.

Mariemont Ave. Cincinnati 27, Ohio

Custom Gear Makers Since 1907

GEARS, good gears only

For more information circle No. 6 on Reader Service Card

AFBMA submits code

NEW YORK, N. Y.—The Anti-Friction Bearing Manufacturers Association, as sponsor of ASA Sectional Committee B54, has submitted an Identification Code for Ball and Roller Bearings to the American Standards Association for approval as an American Standard. Under development by the committee since 1946, the code provides a universal language for describing and identifying all types of ball and roller bearings in order to facilitate communications between manufacturers and users. It is expected to simplify handling of identical bearings made by different manufacturers under different manufacturing numbers.

Worthington reorganizes

HARRISON, N. J.—Worthington Corp. has reorganized its Compressor and Engine Div. in Buffalo. The Engine Sales Dept. becomes two separate groups: Power Engine Sales and Engine Compressor Sales, both reporting to E. A. Murray, manager of sales and service. Alfred M. Boehm is manager, power engine sales; Howard C. Barten is manager, engine compressor sales. The reorganization followed the retirement of Willard E. Wechter, former manager of the Engine Sales Dept.

Dodge names Du Comb

DETROIT, MICH.—W. C. Du Comb Co., Inc., has been appointed by Dodge Mfg. Corp. as a distributor of Dodge power transmission machinery. This is the first such Dodge appointment in the Detroit area in more than 10 years.

Dearborn Rubber moves

CHICAGO, ILL.—Dearborn Rubber Corp. has moved its office-warehouse quarters to 2545 S. 25th Ave., Broadview. The firm, formed in 1954, as the successor to the Chicago branch of Shields Rubber Co., handles power transmission products, packings, expansion joints, and all types of industrial hose, conveyor and elevator belting.

Circle No. 32 on Reader Service Card→

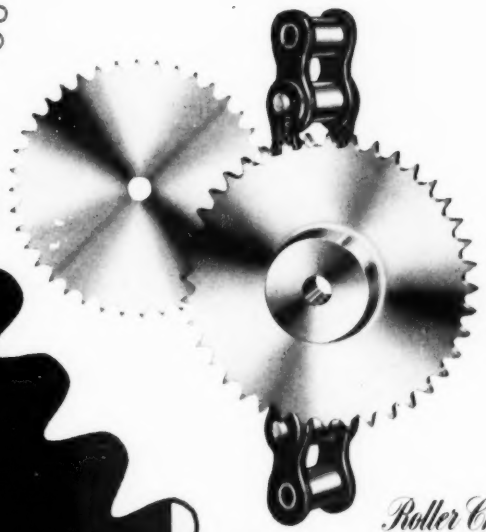
cullman

CULLMAN CULLMAN CULLMAN CULLMAN CULLMAN CULLMAN CULLMAN CULLMAN CULLMAN

cullman

Sprockets and Roller Chains

the big 3-A LINE in the Power Transmission Field



1 ACCURACY IN MANUFACTURING . . . Cullman Sprockets and Roller Chains are manufactured to precise and exact standards, subjected to constant quality control inspection.

2 ADAPTABILITY IN APPLICATION . . . Cullman Sprockets and Roller Chains are efficient, flexible, dependable for a virtually unlimited range of power transmission needs.

3 AVAILABILITY IN SUPPLY . . . Cullman Sprockets and Roller Chains are stocked by leading industrial distributors.

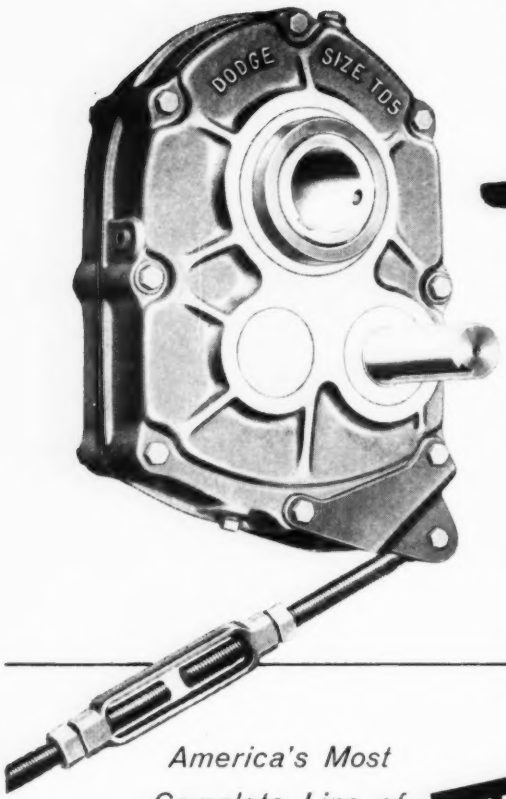
FACTORY WAREHOUSES AT:
821 South Santa Fe Ave., Los Angeles 21, California
239 West 18th St., New York 11, New York
2618 Carnegie Ave., Cleveland 15, Ohio
205 North 11th St., Tampa 2, Florida

Roller Chain Drives Since 1893

cullman wheel company
1344 Altgeld Street • Chicago 14, Illinois

WRITE today for latest free literature . . . plus recommendations for your chain drive requirements.

wheel



Torque-Arm

THE DODGE DEVELOPMENT THAT CHANGED THE NATION'S HABITS OF SPEED REDUCTION

America's Most Complete Line of Shaft Mounted Speed Reducers

55 MODELS

- Capacities up to 170 hp
- Output speeds from 10 to 378 rpm!
- Single Reduction
- Double Reduction
- 5 to 1 Ratio
- 15 to 1 Ratio
- 25 to 1 Ratio
- Any speed ratio up to 150 to 1 obtainable by selection of pre-determined combination of reducer and V-belt drive.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

In fewer than ten years, the range of Torque-Arm Shaft Mounted Speed Reducers has increased from 6 to 55 models, to meet the ever increasing demand for this improved method of speed reduction.

By eliminating foundation, sliding base and flexible coupling this modern speed reducer has saved untold installation time and untold dollars of cost.

The rugged semisteel housing developed by Dodge has never been improved upon. It is corrosion resistant—and it has the strength to hold bearing seats in line for the life of the unit.

Dodge design provides wide spacing for the bearings. Loads are carried easily, contributing to Torque-Arm's long life and very high efficiency. The gears are finest quality—helical, heat treated steel.

Torque-Arm mounts vertically or horizontally in any position around the driven shaft. It locks to the shaft on *both* sides of the housing. The holes in the output hub provide simple removal with puller. Overload release and built-in backstop are optional.

Dodge Torque-Arm is America's most widely used shaft mounted speed reducer. It is stocked by your local Dodge Distributor. Ask him. Or write us for bulletin.

DODGE MANUFACTURING CORPORATION, 8200 Union, Mishawaka, Ind.

DODGE
of Mishawaka, Ind.

For more information circle No. 11 on Reader Service Card

Ray Page is AFBDA "Man of the Year"

CHICAGO, ILL.—At the recent 15th annual fall meeting of the Anti-Friction Bearing Distributors Association, Ray Page (right) received AFBDA's "Man of the Year" award. Page is manager of distributor sales, The Fafnir Bearing Co. Also shown (left to right) are Frank Timble, Ray M. Ring Co., AFBDA president; Olin Livingston, Moffatt Bearings Co., AFBDA chairman of the board of directors; and Joe Moore, Detroit Ball Bearing Co., AFBDA past president.

Gas bearing symposium creates world interest

WASHINGTON, D. C.—The United Kingdom, France, Germany, Austria, Holland, Israel, Japan, Canada, and South America, as well as the U. S., were represented at the First International Symposium on Gas-Lubricated Bearings held recently at the Shoreham Hotel, Washington.

This meeting was sponsored by the Office of Naval Research in cooperation with Air Force Office of Scientific Research, Army Engineer Research and Development Laboratories, Atomic Energy Commission, Bureau of Aeronautics, Bureau of Ordnance, Bureau of Ships, Maritime Administration, National Aeronautics and Space Administration, and Wright Air Development Center. Meeting was conducted by The Franklin Institute.

Twenty papers were presented on various aspects of gas bearing design and application. These included: "General Review of Gas Bearing Technology", by D. D. Fuller; "Air Bearings—Research and Application at N. E. L., Scotland", by M. Graneek and J. Kerr; "Dynamic Stability Aspects of Gas-Lubricated Journal Bearings," by B. Sternlicht and H. Poritsky, General Electric Co.; "On High-Speed Self-Acting Gas Bearings," by N. Tipei and V. N. Constantinescu, Academia Republicii Populare Romino, Bucharest, Romania; "Survey of Gas-Lubricated Bearing Research in Japan with Recent Developments in the Study of Externally-Pressurized Bearings," by T. Sasaki and H. Mori, Kyoto University, Kyoto, Japan.

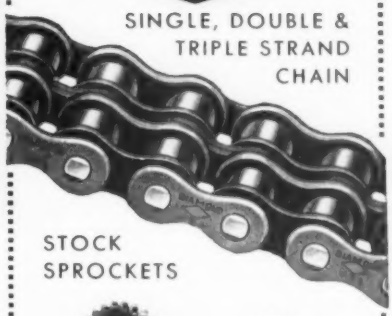
Complete proceedings of the meeting, including all papers, a panel discussion, and all significant comments from the floor will be printed and made available.

Industrial Transmissions relocates offices

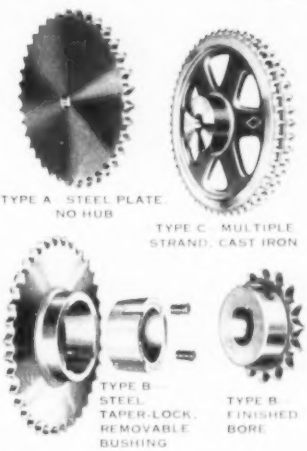
BUFFALO, N. Y.—Industrial Transmissions, Inc., and A. T. Supply, Inc., have moved their offices and warehouse to 7 Terrace.

for power transmission

DIAMOND
Roller Chain & Sprockets



STOCK SPROCKETS



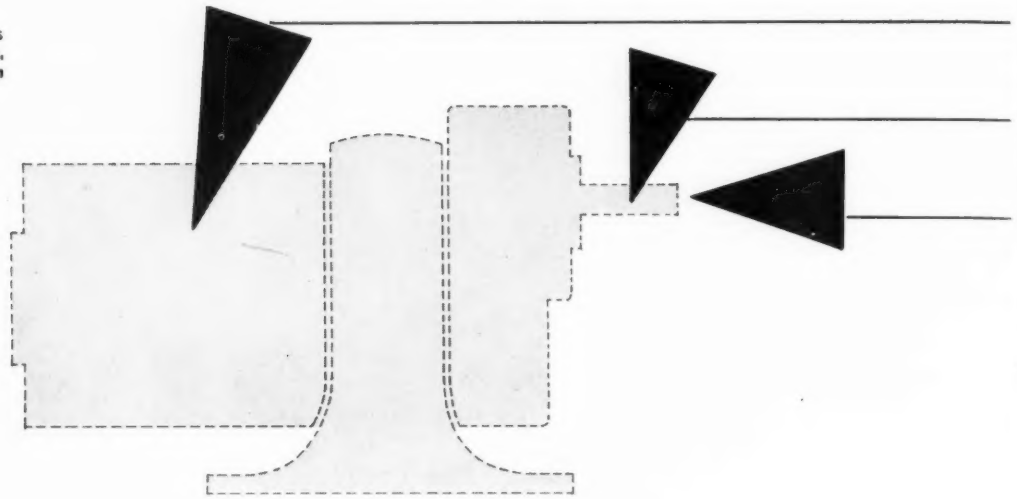
◆ It's sound engineering to use stock DIAMOND Roller Chain for efficient drives, even on the most highly specialized machinery. Standard DIAMOND Roller Chain and stock Sprockets shorten development time, cut power transmission design costs, lower production costs. For power transfer, precision timing, conveying—whatever the application—traditionally high quality DIAMOND Roller Chain Drives assure long, continuous, trouble-free performance . . . easy, economic maintenance.

Write now for your copy of latest DIAMOND Chain and Sprocket Catalog!

DIAMOND CHAIN CO., Inc.
A Subsidiary of
American Steel Foundries
Dept. 718 • 402 Kentucky Avenue
Indianapolis 7, Indiana

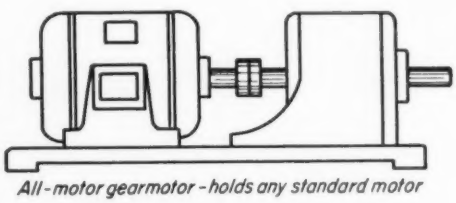
Circle No. 8 on Reader Service Card

For extra free copies of this 10-page article, circle number 300 on Reader Service Card.

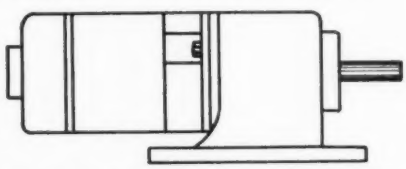


Put your power where

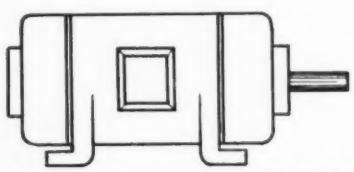
Gearmotors are large and small, a-c and d-c



All-motor gearmotor - holds any standard motor



Integral gearmotor – housings support each other



Gearhead gearmotor – gears and motor in same housing

A gearmotor consists of a motor and gear reduction unit combined as a single unit.

Gearmotors are called different things. There are gearhead motors, motorized gearboxes, motor reducers, geared motors, ratiomotors, motorized reducers, motoreducers, synchrogear motors and motorgears. This variety of names is somewhat confusing but each is intended to identify a manufacturer or specify a special arrangement of gears with respect to the motor.

In an integral gearmotor, the frame of the gearbox supports the frame of the motor; in an all-motor gearmotor, the two are mounted together but the frame is built to hold any standard motor.

A gearmotor can be a-c or d-c. It can be subfractional or many hundred hp. The motor can be open, enclosed, drip-proof, lint-proof, submersible or other.

The gears in the gearbox can be spur, helical, worm, bevel or other. The gearbox can be single reduction, double, triple, quadruple, and so on. It can have parallel shafts, right angle shafts, vertical, horizontal or tilted. The shaft can be mounted to swivel, or there might be two, three, four or more.

Chief advantage of a gearmotor is that it places the work shaft at the point of work, eliminates belts, pulleys, chain and counter-shafts. Interchangeability of standard parts gives almost any configuration.

Convert motor speed...

to usable shaft speed...

right where you want the work done

the work is—with a gearmotor

There's a gearmotor for every application

A GEARMOTOR IS ANALOGOUS to building blocks. It consists of two, three, four or more basic components mounted together.

It always consists of a motor and a gear reduction set. It sometimes has a separate mounting base to provide selective mounting positions. It sometimes has an integral flange for mounting the whole unit in different positions or just the gear box and not the motor. The idea of a gearmotor is to provide usable shaft power at the right speed at the place of work.

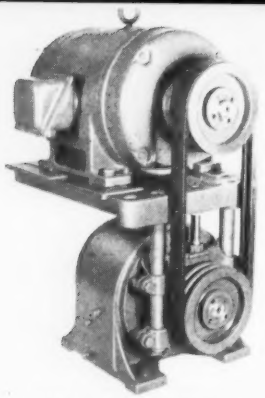
The ideal method of transmitting torque from a motor to a shaft is by direct connection to the machine shaft. Direct drive lets the motor deliver maximum power and results in a compact, highly efficient motor-driven machine.

In most applications, speed of the motor is greater than that of the machine. A gear drive or mechanical linkage between the motor and machine is necessary. Such systems are of two classes: nondirect contact, which includes belts, ropes, and chain drives; direct contact, which are friction drives, or gears.

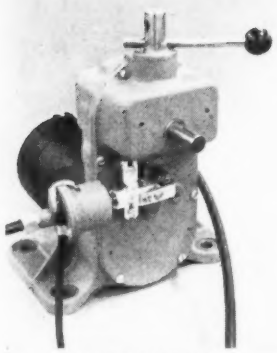
Nondirect contact allows the motor to be placed at a distance from the driven shaft. This may prove advantageous in certain cases, but it usually causes a more cumbersome installation.

Rope and belt drives have great ability to absorb

PLANT ENGINEER mounts gearmotor on platform adjacent to pumping unit in chemical plant.



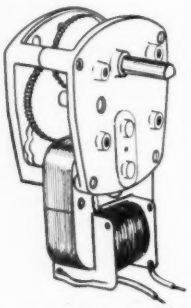
SPECIAL CONSTRUCTION



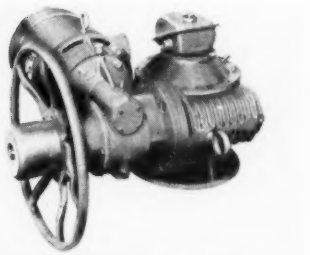
SHAFT RESPONDS TO DIFFERENT SIGNALS

ALL-MOTOR, WITH MOTOR AND GEAR BOX CONNECTED BY COUPLING

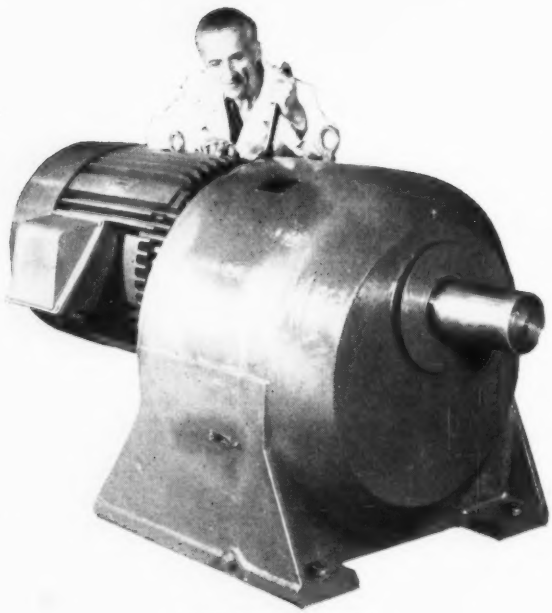
ANY KIND OF GEARS – ANY KIND OF MOTOR



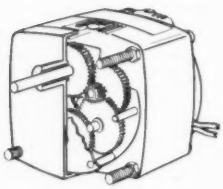
SPUR GEARMOTOR FOR VENDING MACHINES



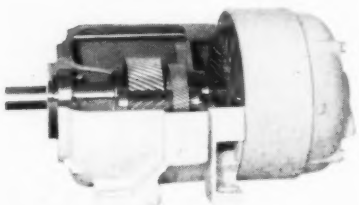
ALSO HANDWHEEL OPERATED



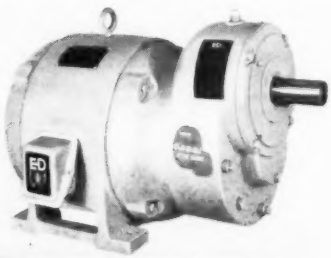
HEAVY DUTY GEARMOTOR



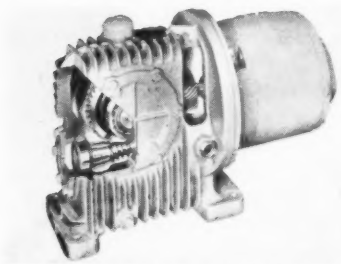
FRACTIONAL GEAR-HEAD GEARMOTOR



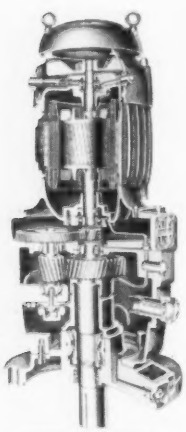
HIGH LOAD CAPACITY



GEARS IN OIL LAST LIFETIME

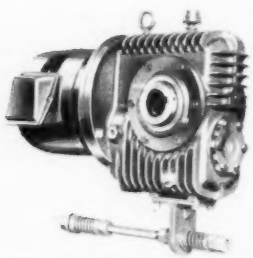


DOUBLE-ENVELOPING WORM GEARING



VERTICAL MOUNT, DOUBLE REDUCTION

MINIATURE PLANETARY GEARHEAD



HOLLOW SHAFT

shock, but a disadvantage is inability to maintain positive speed ratios.

Chain drives provide positive speed but continuous use causes wear and stretch. Wear requires replacement of links or means for taking up slack.

Direct-contact drives are more compact than non-direct drives and are suited for installations having space limitations.

Friction drives give enough shock protection for sudden stall but there is no way to guarantee positive and continuous speed reduction since they lack positive action.

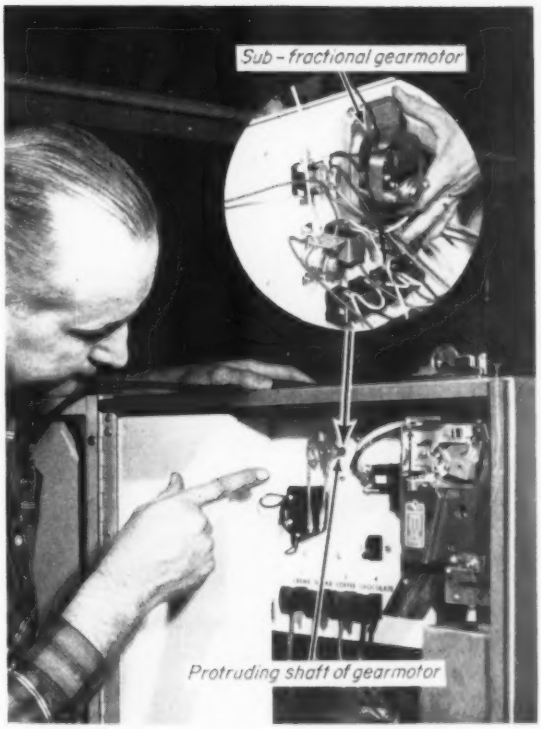
Gear reduction, such as with a gearmotor, provides advantages over these other types. The motor and speed reducer as one unit provide compactness and simplicity. In addition, you count on a specific motor manufacturer for performance of the motor and a gear box manufacturer for performance of the reduction unit.

Efficiency of gearmotors depends on reduction ratio. Helical gears have highest efficiency. Loss is about 1½% per mesh (30:1 double reduction has 3 to 4% loss). Worm gear loss is approximately reduction ratio divided by 2 (30:1 ratio has 15% loss).

Classifications

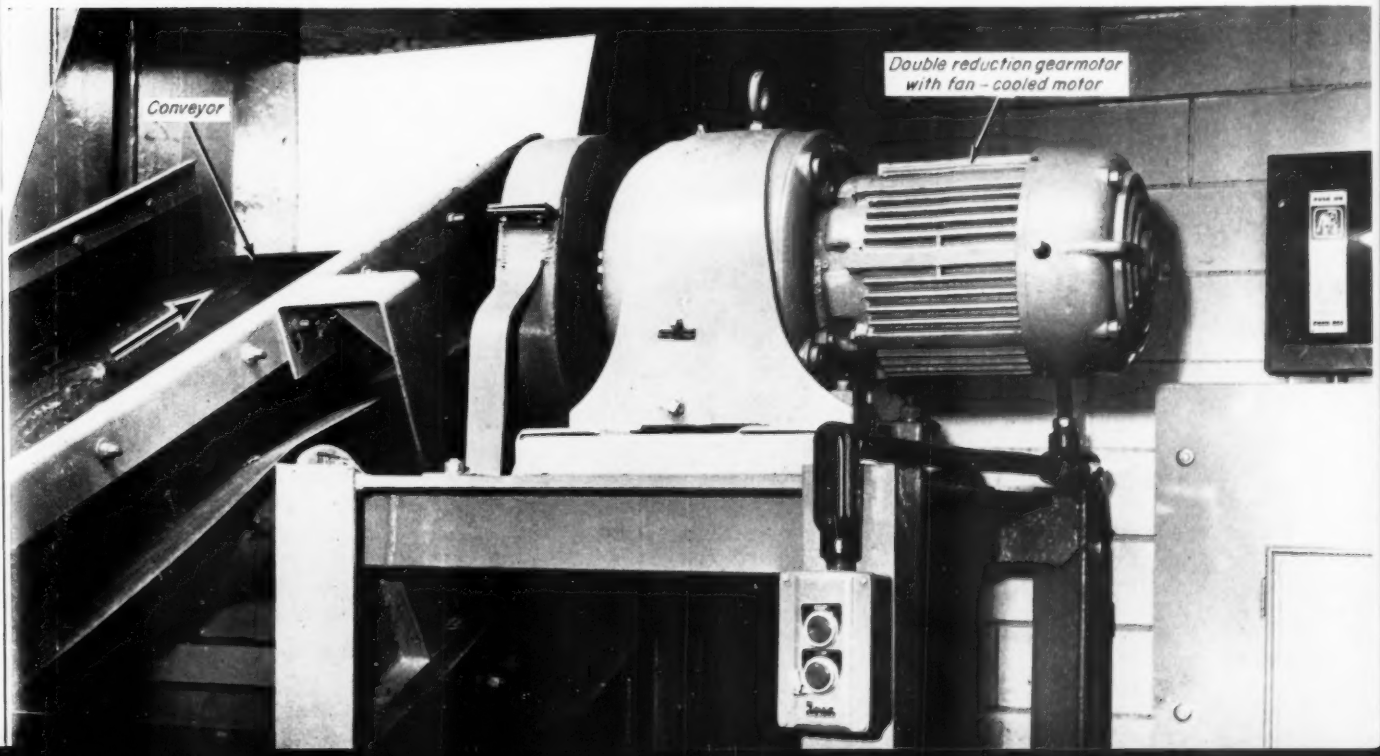
There are three standard classifications of gearmotors:

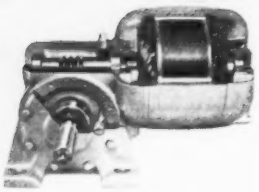
Class I—for steady loads not exceeding load rating of motor; for light shock loads; for 10 hour day operation. When operation is intermittent, moderate shock loads are allowable. Gears are selected so that their power



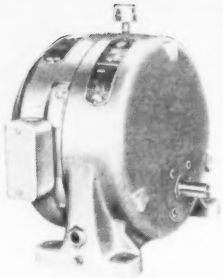
ELECTRONIC PANEL of vending machine has sub-fractional 60 cps gearmotor mounted behind panel with shaft protruding to drive timer. Miniature aspect is chief feature, shaft turns at 7 rpm.

BELT CONVEYOR in incinerator plant is powered by integral-type gearmotor mounted directly to conveyor shaft, eliminates previous countershaft and other accessories.

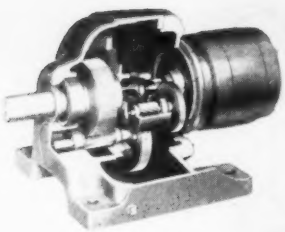




SLOW SPEED
WORM



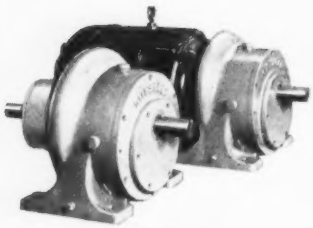
COMPACT



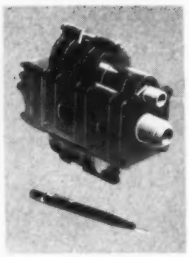
TRIPLE-REDUCTION

OIL-TIGHT FOR
SANITARY
APPLICATIONS

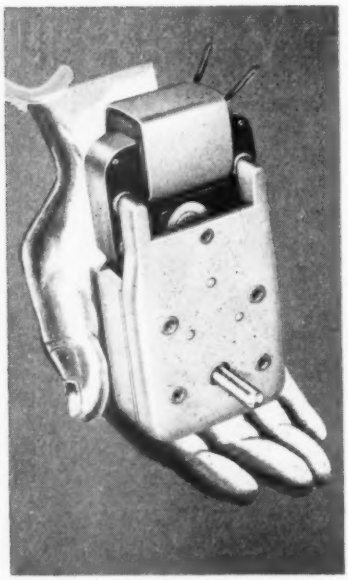
ANY KIND OF GEARS – ANY KIND OF MOTOR



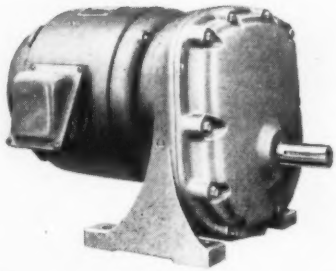
GEARBOX AND
GEARMOTOR



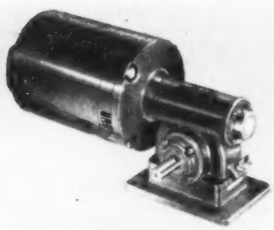
AIR-MOTOR
GEARMOTOR



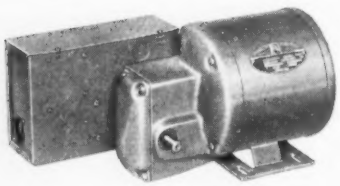
SUB-FRACTIONAL WITH A-C MOTOR



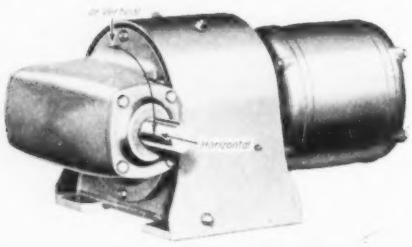
PARALLEL SHAFTS



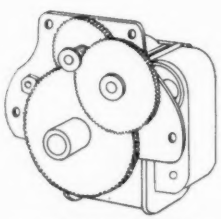
DRIP-PROOF, VENTILATED,
SINGLE OR 3-PHASE



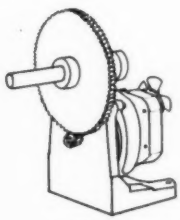
INSTANT REVERSE
WITH BUILT-IN CONTROLS



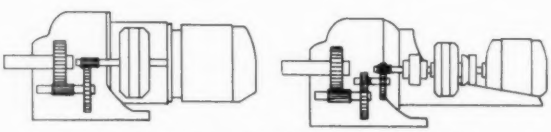
CHOOSE YOUR SHAFT POSITION



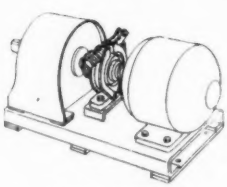
FRACTIONAL GEARMOTOR
WITH EXPOSED GEARS



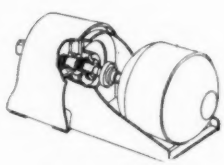
OPEN
CONSTRUCTION



FLUID COUPLING BETWEEN MOTOR AND GEARBOX



BRAKE BETWEEN
MOTOR AND GEARBOX



ONE-WAY CLUTCH
PREVENTS REVERSING

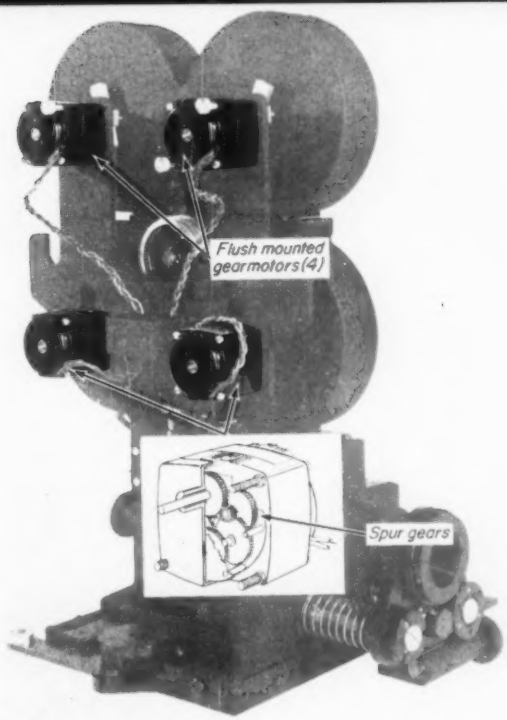
rating equals motor rating. This relationship gives a service factor of 1.

Class II—for steady loads not exceeding load rating of motor; for 24 hour day operation. Moderate shock loads are allowable during 10 hour day. Gears are used so that their power rating divided by service factor of 1.4 is made equal to motor rating.

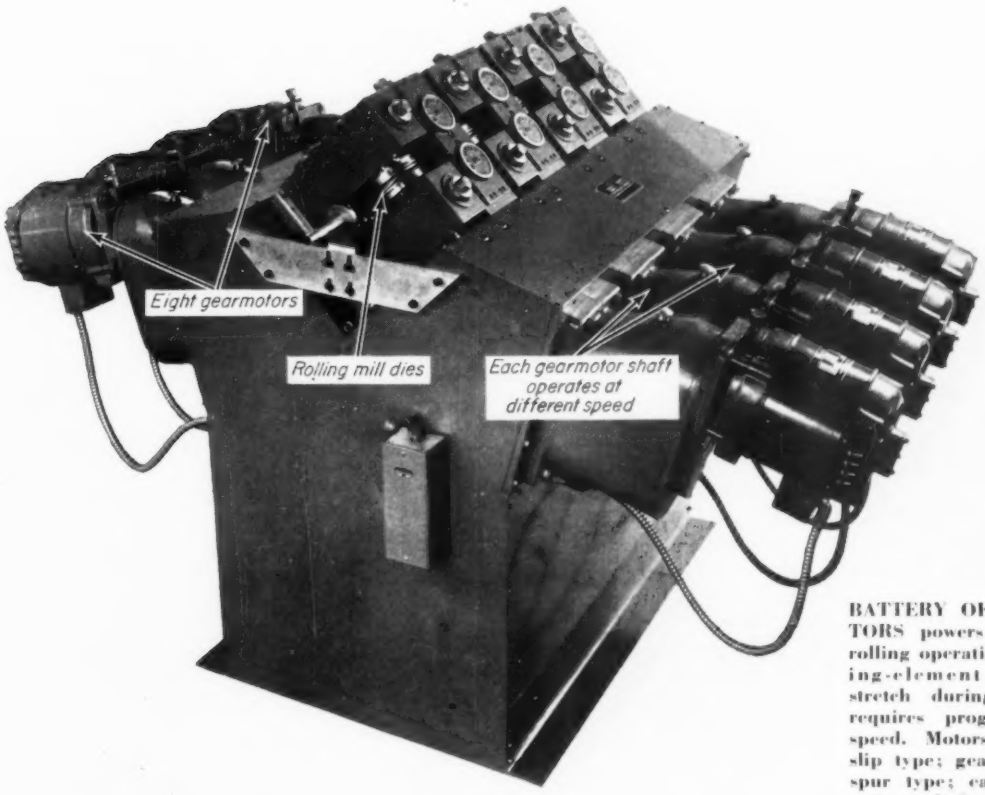
Class III—for moderate shock loads during 24 hour day. Heavy shock loads are allowable during 10 hour day. Gears are selected so that their power rating divided by service factor 2 is made equal to motor rating.

Intensity of shock load is allowed to vary inversely with frequency of peak loads.

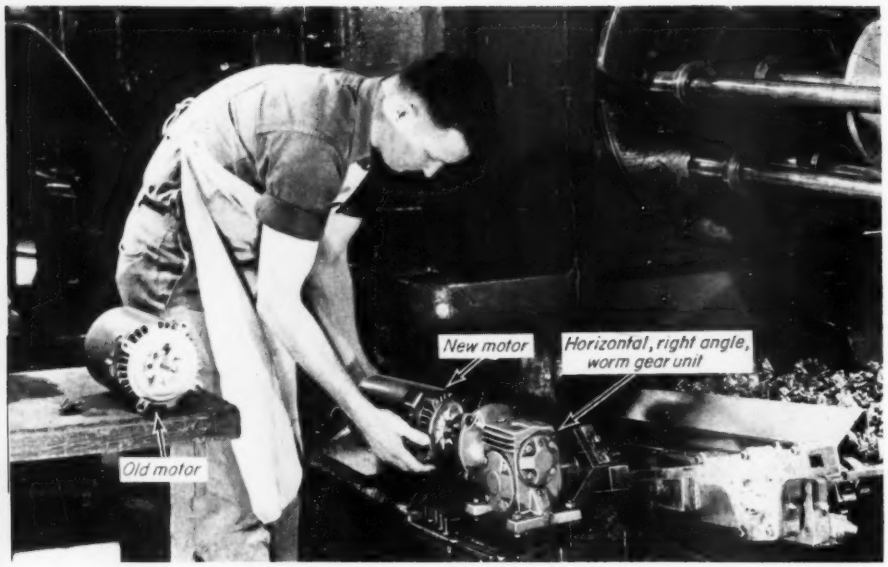
Applications with high-torque and intermittent-operation motors, and applications where extreme repetitive shock occurs, or where high-energy loads must be absorbed as when stalling, are given special design consideration. Such applications include drives for runout tables, sheet catchers, etc., also machines with flywheels on output shafts. It is not a good idea to use a flywheel on the input shaft of a gearmotor without



OPTICAL INSTRUMENT uses four 1/750 hp, 1675 rpm gearmotors. Reduction ratio is 18:1 and torque at each shaft is 8.6 in.-oz. Units are flush mounted permitting direct connection of motor shaft to reel shaft.



BATTERY OF GEARMOTORS powers continuous rolling operation for heating-element rods. Rod-stretch during operation requires progressive roll speed. Motors are high-slip type; gear boxes are spur type; each has two output shafts turning in opposite directions.



GEARMOTOR SERVICEABILITY is expressed in this picture. Old motor can be removed and new one installed in minutes. Unit shown powers chip conveyor on automatic boring machine.

GEARMOTORS *continued*

checking with the manufacturer. When a motor is equipped with a brake, and torque rating of the brake exceeds that of the motor, the brake rating then must determine the design and selection of the gearing. Such cases get special design consideration.

A gearmotor designed for special service has its nameplate marked "*Class - - - Special*" by the manufacturer.

Many typical and common applications of gearmotors have been listed in Standard Application Classification for Gearmotors, AGMA 150.01. The classification numbers I, II and III are designated according to the nature of the load and duty cycle, and correspond to gearmotor service class numbers. Sufficient number of applications are covered to serve as a guide for the selection of gearmotors for most services.

AGMA and NEMA

American Gear Manufacturers Association and National Electrical Manufacturers Association are two national organizations that establish and control configurations, ratings and classifications of gearmotors. AGMA is located in Washington D. C.; NEMA is located in New York City.

These two groups have committees made up of qualified engineers from companies that manufacture gearmotors for resale, companies that manufacture gearmotors for their own use, and companies that use gearmotors—such as machine tool manufacturers.

Selection

Choose a gearmotor as you would a motor and gearbox. Determine all conditions of motor operation, type, hp, voltage, frequency, enclosure, etc. Determine conditions needed in the gear reduction set, such as type of gears, ratings, reduction ratio, mounting, direction of output shafts, and so on.

If horsepower is not known, compute it with this formula

$$\text{Output hp} = \frac{\text{torque required lb-ft} \bullet \text{output rpm}}{5250} \quad \ldots (1)$$

Also check for overhung load; that is, if the gearmotor is not direct connected to the driven equipment.

Overhung loads are divided into three classes:[1]

Class I—for steady loads not exceeding normal rating of motor and eight hours a day service. Moderate shock loads where service is intermittent.

Class II—for steady loads not exceeding normal rating of motor and twenty-four hours a day service. Moderate shock loads for eight hours a day.

Class III—for moderate shock loads for twenty-four hours a day. Heavy shock loads for eight hours a day.

External overhung load ratings for low speed shafts can be obtained from the equation

$$W = \sqrt[3]{\frac{290\,T^2}{K}} \quad \ldots (2)$$

Where

W = overhung load, lbs.
T = torque transmitted by the low speed shaft, lb-in.
K = variable depending on service classification
Class I = 1.00
Class II = 1.41
Class III = 2.00

[1] *Based on shaft stress and deflection limitations at lower speeds according to AGMA 462.01. At higher speeds, some manufacturers prefer calculations based on limitations of bearings. Consult your manufacturer.*

Values for preferred output speeds and integral horsepowers are shown for the three classes in the AGMA Bulletin or in most manufacturers' catalogs.

Overhung loads are based on the load being at a distance of one shaft diameter out from the oil retainer. Shaft extensions can be any diameter but stresses must be kept within the allowable specification. Virtually all manufacturers have access to this information.

Tangential force on the shaft can be obtained from the equation

$$W_T = \frac{63000P}{N\ R_p} \quad \text{.....(3)}$$

or

$$W_T = \frac{T}{R_p} \quad \text{.....(4)}$$

Where

W_t = tangential force, lbs.
P = transmitted hp
R_p = pitch radius of sprocket, pinion, or pulley, inches.
T = torque transmitted by low speed shaft, lb-in.

Values of tangential force must be multiplied by the following factors to obtain the overhung load on the shaft

Chain—1 Flat belt—2-1/2
V-Belt—1-1/2 Pinion —1-1/4

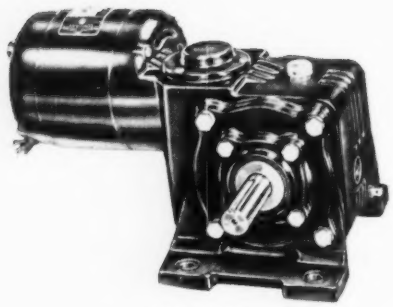
Procedure

Determine the gearmotor hp from the above formula. Compute gear calculations based on motor hp. If multi-

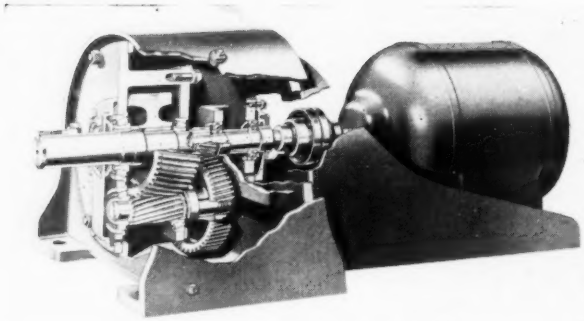
Gearmotor manufacturers*

Abart Gear & Machine Co.
Allis-Chalmers Manufacturing Co.
The Louis Allis Co.
Baldor Electric Co.
Barber-Colman Co.
Bodine Electric Co.
Boston Gear Works
Brad Foote Gear Works, Inc.
Brevel Products Corp.
The Brown-Brockmeyer Co.
Century Electric Co.
J. D. Christian Engineers
Cone Drive Gears Div. Michigan Tool Co.
Continental Electric Company, Inc.
Crofts, U.S.A., Inc.
Diehl Manufacturing Co.
Doerr Electric Corp.
Electra Motors, Inc.
Electro Dynamic Div. General Dynamics Corp.
Elliott Company Div. Carrier Corporation
Fairbanks, Morse & Co.
The Falk Corporation
Foote Brothers Gear & Machine Corp.
Franklin Electric Co., Inc.
General Electric Co. Apparatus Sales Div.
Globe Industries, Inc.
Grant Gear Works, Inc.
Hansen Manufacturing Co.
Hewitt Robins, Inc. Jones Machinery Div.
Howard Industries Cyclohm Motor Corporation Div.
Howell Electric Motors Co.
Imperial Electric Co.
D. O. James Gear Manufacturing Co.
Janette Electric Manufacturing Co.
Kearfott Company, Inc.
Lamb Electric Co.
Lear Incorporated
G. H. Leland, Inc.
Lima Electric Motor Co., Inc.
Link-Belt Company
Mantel Gear Works
Marathon Electric Manufacturing Co.
Master Electric Co. Div. Reliance Electric & Engineering Co.
Merkle-Korff Gear Co.
Metron Instrument Co.
Morse Chain Co.
Motoresearch Company
New England Gear Works
Odin Corporation
Ohio Gear Company
Peerless Electric Company
Philadelphia Gear Corporation
Rae Motor
Reliance Electric & Engineering Co.
Reuland Electric Co.
E. B. Sewall Manufacturing Co.
A. O. Smith Corp.
Speedway Motor Div. Thor Power Tool Co.
Sterling Electric Motors, Inc.
U. S. Electrical Motors, Inc.
Von Weise Gear Corp.
Wagner Electric Corp.
Western Gear Corp. Electro Products Div.
Westinghouse Electric Corp.

*responding to our questionnaire

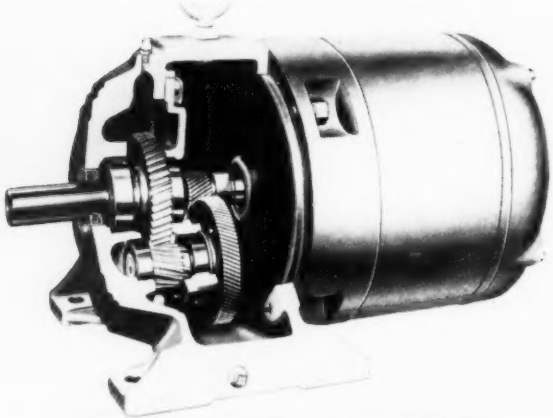


SPLIT-PHASE,
RIGHT ANGLE GEARMOTOR

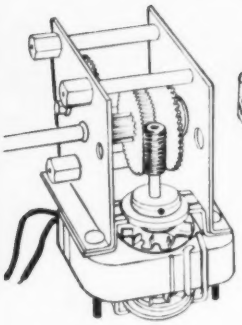


ALL-MOTOR: USES ANY STANDARD MOTOR

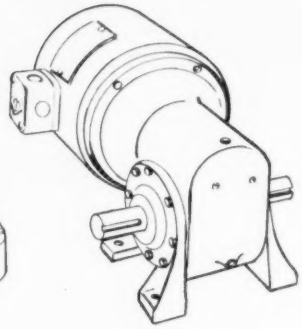
ANY KIND OF GEARS – ANY KIND OF MOTOR



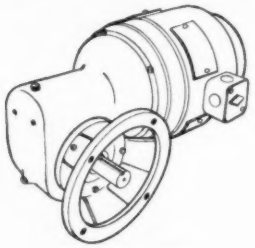
INTEGRAL: COMBINES MOTOR AND REDUCER HOUSINGS



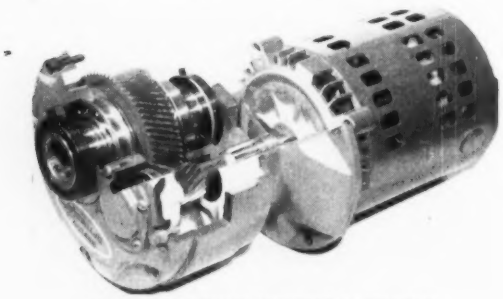
FOR APPLIANCES
AND COIN MACHINES



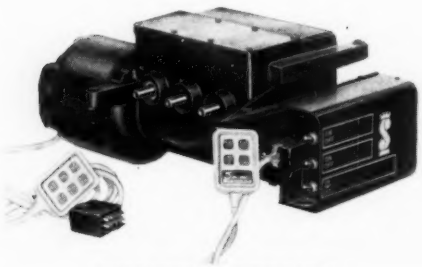
TWIN OUTPUT
SHAFTS



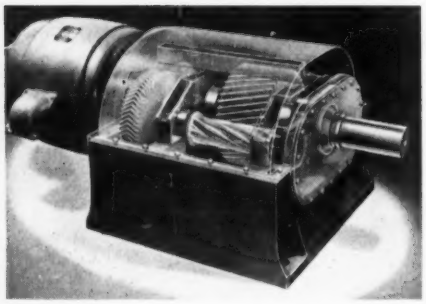
FLANGE-MOUNTED



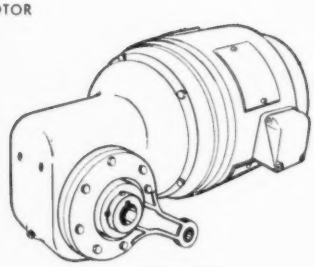
CUTAWAY OF SHAFT-MOUNTED GEARMOTOR



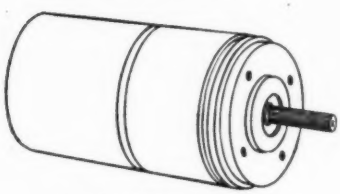
PUSH BUTTONS SELECT SHAFTS



DOUBLE REDUCTION, PARALLEL SHAFTS



SHAFT-MOUNTED



GEARMOTOR WEIGHS 6 OZ.

speed or adjustable-speed motors are to be used, base gear calculation on motor horsepower and speed at point of maximum torque and speed.

Establish AGMA service classification, whether Class I, II, III. Where specific loads are known, consult "Duration of Maximum Peak Loading Curves" which will appear in the February issue of this magazine. Do not exceed maximum allowable peak loadings. Where the specific loads are not known, consult "AGMA Service Load Classification Chart" also in the next issue of this magazine.

Determine correct reducer size, based on the desired output speed, class of service, and horsepower required. Select the reducer frame size, in Class I, II, III, from selection tables, from your manufacturer's catalog.

Check overhung load on the output shaft if reducer is not directly coupled to the driven shaft. Overhung load may be determined by formula. Calculated load should not exceed values tabulated by the manufacturers for size and rpm of the unit.

Determine mounting position.

Determine motor size, enclosure, voltage, frequency, phase, continuous or intermittent duty, according to NEMA ratings (normal torque, high starting torque, high torque, high slip, etc.).

Check possible motor and reducer frame combinations, from manufacturer's catalogs to determine if reducer frame and motor frame will fit together.

Check dimensions to insure if proper clearance is obtained on driven machine.

Example

Select an integral gearmotor for a uniformly-fed conveyor to provide 575 ft-lb torque at 37 rpm. Operation is 8 hour day, peak loadings of 200% twice a day. Gearmotor is to have output speed of 37 rpm and is to drive a sprocket with a diameter of 10 inches. Motor is 1750 rpm, 3 phase, 60 cycles, 220 volts, totally-enclosed fan-cooled, normal torque.

Solution

Output horsepower is $\frac{575 \times 37}{5{,}250} = 4.05$ hp

Use a 5 horsepower gearmotor.

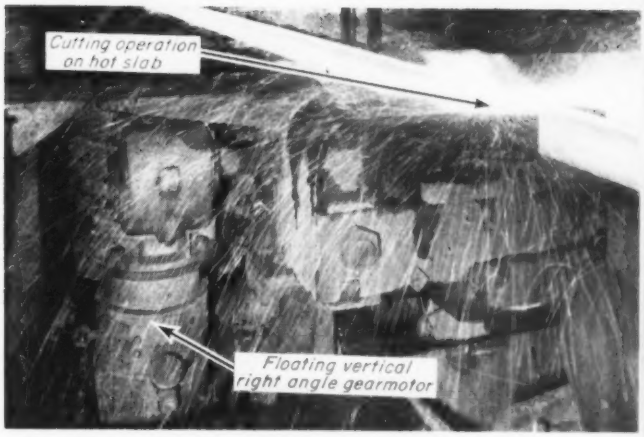
Consult AGMA Service Load Classification and Duration of Maximum Peak Loadings in next issue of this magazine or from AGMA Standards. This is listed as Class I service.

Selection tables in any manufacturer's catalog will show the basic reducer frame size.

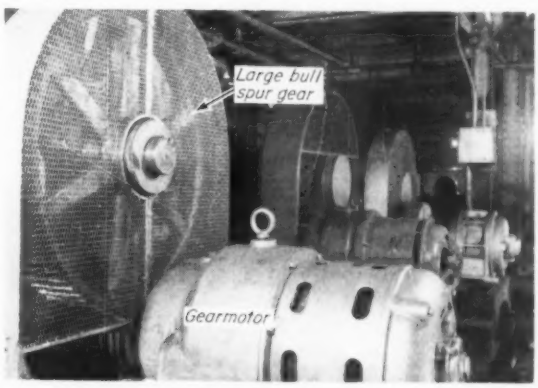
Check overhung load. Sprocket weight is negligible. Overhung load is computed to be

$$\frac{63000 \times 5}{37 \times 5} = 1700 \text{ lbs.}$$

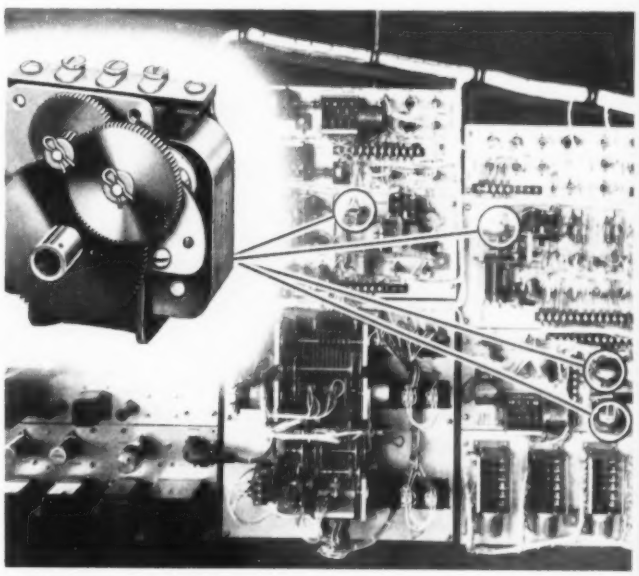
Specific manufacturer's gearmotor can now be selected. ▲▲▲



HOT SLAB is cut during rolling operation. Row after row of floating vertical gearmotors power rolls in continuous operation.



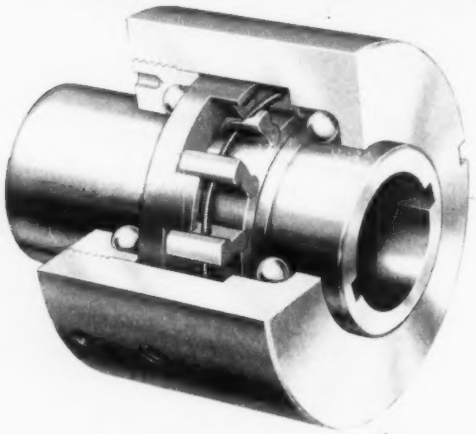
LARGE INTEGRAL GEARMOTOR operates cooker in tallow plant. Bull gear in background is driven by open gearing. Gearmotor in foreground reduces maintenance.



AIRSPEED, ALTITUDE, thrust and ground speed are computed on electronic panel; gearmotors act as position servo drives for computing simulated flight data.

NEW PRODUCTS

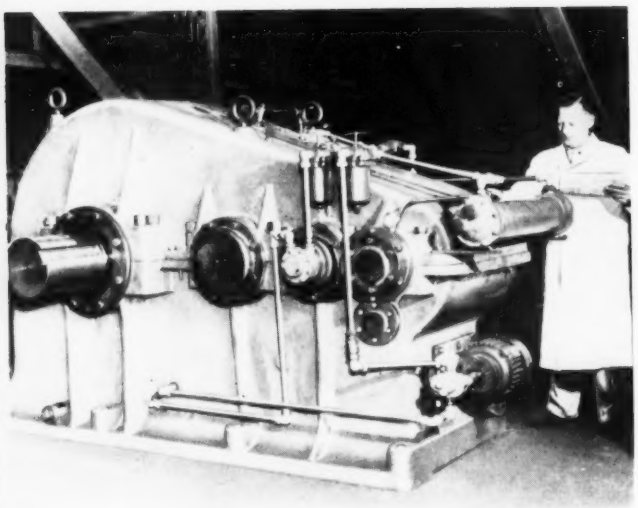
Dual torque-locking and positioning device



A dual torque-locking and positioning device not only drives, positions, over-runs, and backstops in two directions, but also provides automatic and positive prevention of torque feedback from either direction. Because two sets of sprags are arranged in opposing pairs between the output member and outer race, a multiple number of sprag contact surfaces engage the outer race when torque feedback or backstopping conditions are present. This provides equalized radial loading during unusually high feedback torque. The entire complement of sprags, which is a part of the output member assembly, rotates at driving speed while outer race remains stationary. Thus, the sprags are always in light rubbing contact with the outer race and are ready to pick up the feedback load instantaneously at constantly changing points on the outer race.

Formsprag Co., Warren, Mich.

Circle No. 200 on the Reader Service Card

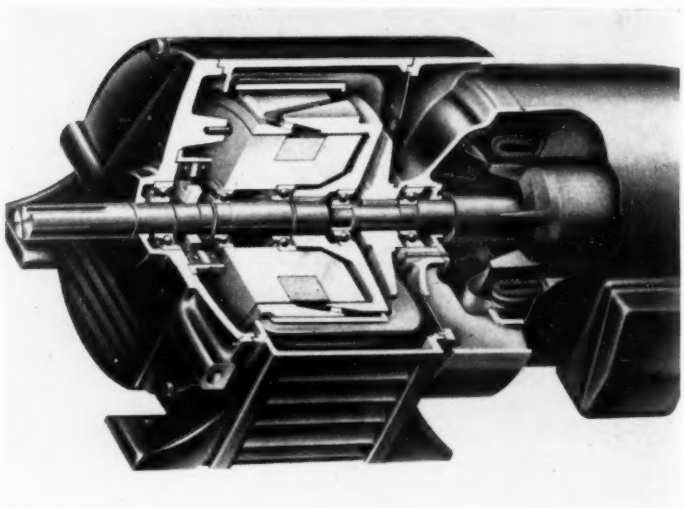


Helical speed reducers

Because of precision-ground gearing, a series of quadruple-reduction, helical speed reducers features minimum noise, vibration, and backlash. AGMA ratios are 106:1 to 650:1, and ratings to 815 hp with an efficiency rating of 95%. Special precision grinding, resulting in accurate tooth profile, profile spacing, and surface finish, gives: (1) increased load-carrying capacities with no sacrifice of performance, (2) extended gear life due to improved accuracy which eliminates initial running-in, and (3) virtual elimination of vibration because of smoother tooth contact. Also, gear noise is reduced to a point where it is no longer a problem in enclosed areas. Gearing and shafts are machined from alloy steel forgings.

Philadelphia Gear Corp., Philadelphia, Pa.

Circle No. 201 on the Reader Service Card

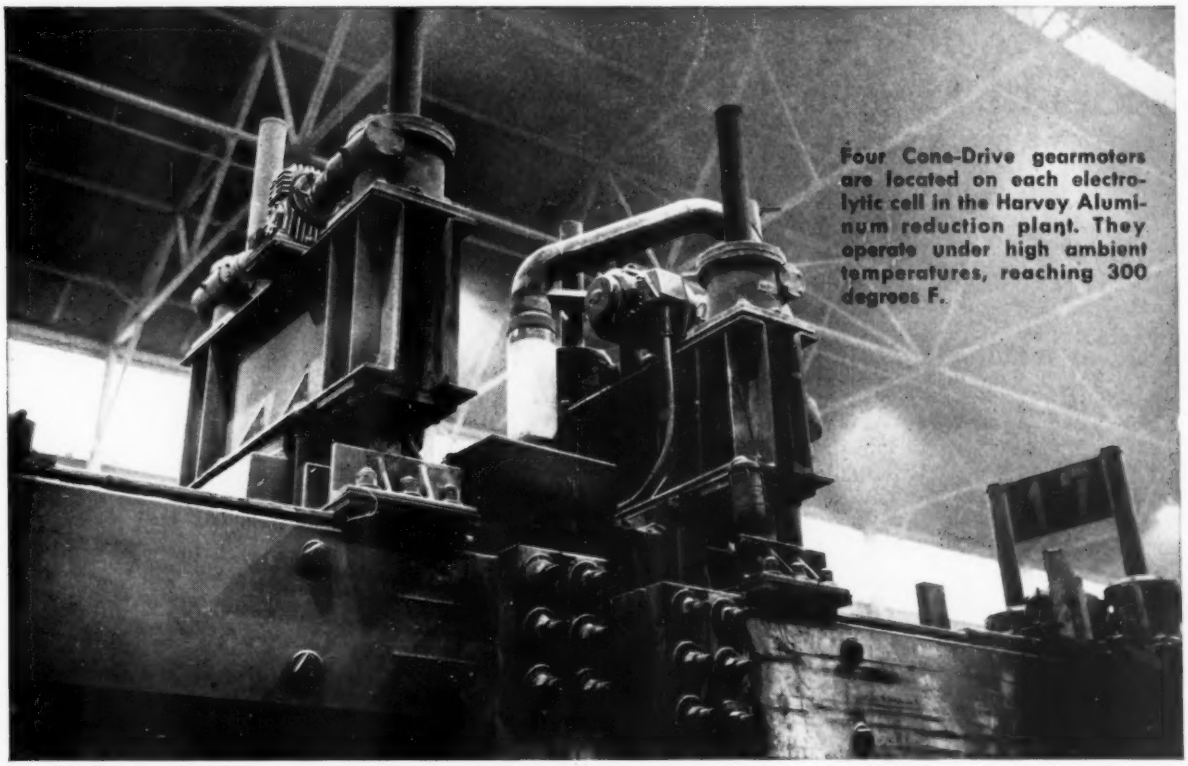


Adjustable speed drives

A line of eddy current coupling adjustable speed drives from 5 to 100 hp features simplified design with fewer moving parts for longer service life and reduced maintenance. The Kinatrol drive is a complete package, including the drive unit, control enclosure with control for both coupling and integrally mounted a-c motor, and operator's station. Ratings through 20 hp are capable of continuous operation down to 100 rpm at rated torque providing a speed range of about 17:1. Coupling design has new bearing arrangement to assure positive gap alignment in service and simplified disassembly and reassembly. Coupling field coil and tachometer generator are stationary, with no brushes or slip rings.

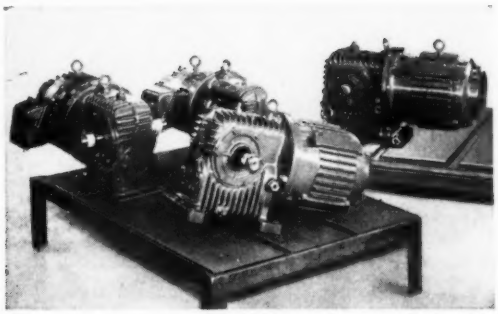
General Electric Co., Erie, Pa.

Circle No. 202 on the Reader Service Card



Four Cone-Drive gearmotors are located on each electrolytic cell in the Harvey Aluminum reduction plant. They operate under high ambient temperatures, reaching 300 degrees F.

1,000 CONE-DRIVE Gearmotors to produce 100,000,000 lbs per year at Harvey Aluminum



Four double-enveloping worm gearmotors used by Harvey Aluminum are shown here after test run in Cone-Drive plant. They were palletized in groups of four for shipment to Oregon smelter.

From its modern reduction plant at The Dalles, Oregon, Harvey ships primary aluminum in pig, ingot and billet forms all over America. The smelter includes the latest and most efficient equipment and operating techniques. Reflecting this modern equipment are 1,000 Cone-Drive double-enveloping worm gearmotors, used to control the height of anodes and casings in relation to the molten aluminum bath in each of the electric furnaces. Annual capacity is more than 100-million pounds.

The gearmotors are operated under high ambient temperatures that reach 300° F. This was an important consideration in Harvey's selection of Cone-Drive gearmotors. In addition, the ability to withstand the full force of stalled driving motors and constant reversing operations figured in Cone-Drive gearing's selection.

Cone-Drive double-enveloping worm gearmotors are available in a wide variety of styles and sizes. Models include standard shaft or hollow shaft with worm over or under or gearshaft vertical. Capacities range from ¼ to 40 HP and reductions from 3.3:1 to 240:1. Ask for Catalog No. 58 for complete specifications.

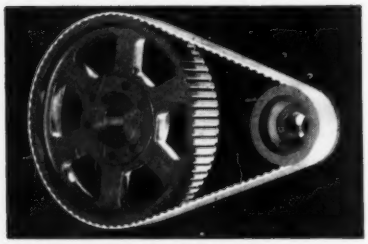
CONE-DRIVE GEARS DIVISION MICHIGAN TOOL COMPANY

7171 E. McNichols Road • Detroit 12, Michigan • Telephone: TWinbrook 1-3111

DOUBLE-ENVELOPING WORM GEARSETS | DOUBLE-ENVELOPING WORM GEAR SPEED REDUCERS | DOUBLE REDUCTION WORM GEAR SPEED REDUCERS | DOUBLE-ENVELOPING RIGHT ANGLE GEARMOTORS

For more information circle No. 27 on Reader Service Card.

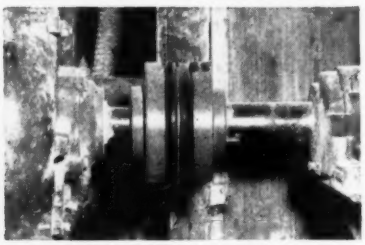
WOOD'S POWER TRANSMISSION PRODUCT NEWS



POSITIVE ACTION—LONG LIFE

Wood's Timing Belt Drives provide positive, slip-free action. Belts are all muscle. No high initial tension, tension devices or lubrication needed. Drives are light weight, compact . . . quiet and clean. Wide load and speed range. Equipped with famous Sure-Grip Bushings. Write for Bulletin 2100.

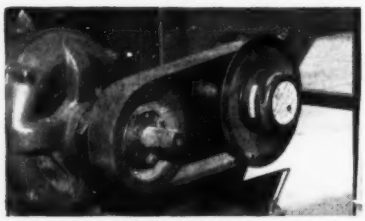
Circle No. 38 on Reader Service Card



4-WAY FLEX—UNIQUE DESIGN

Wood's Sure-Flex Couplings absorb 5 to 15 times more shock and vibration than other leading flexible couplings . . . swallow all types and combinations of angular and parallel misalignment, end-float. Simple, no wear, no lubrication. Low cost. Write for Bulletin 5103.

Circle No. 39 on Reader Service Card



REVOLUTIONARY NEW VARIABLE

Revolutionary resilient cam follower construction of Wood's new "MCS" motion control, variable speed drives holds constant driven speeds under varying torque loads. Like the "MS," the "MCS" won't freeze or stick. Check oil only once or twice a year. Write for Bulletins 8102, 4101.

Circle No. 40 on Reader Service Card

MP/360A

Woods

T. B. WOOD'S SONS COMPANY

CHAMBERSBURG, PENNSYLVANIA

ATLANTA • CAMBRIDGE • CHICAGO
CLEVELAND • DALLAS

PRODUCTS *continued*

New bearing mounts

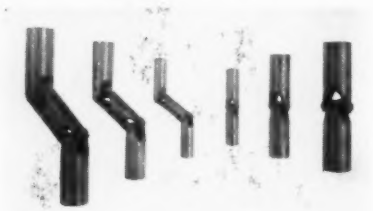
Lube-Align pillowblocks combine self-alignment features with oil-impregnated bronze bearing nested in aluminum die-casting. Units relieve stress on rotating shaft and bearing through application of ball-joint principle. Shaft sizes are ½, ⅝ and ¾ in.

Bronze Bearings, Inc., Chicago, Ill.

Circle number 203 on reader service card

Tiny universals

Double universal joints with zero backlash cancel the non-linearity of



phase relationship of single joints. Preloaded bearing surfaces have burnished sockets and precision balls with sealed-in lubrication. They are bored to shaft sizes 3/32, 1/8, 3/16, and 1/4 in.; maximum operating angle, 60 degrees; maximum torque, 4 to 64 in.-oz.

Falcon Machine & Tool Co., Inc., Cambridge, Mass.

Circle number 204 on reader service card

Bushed couplings

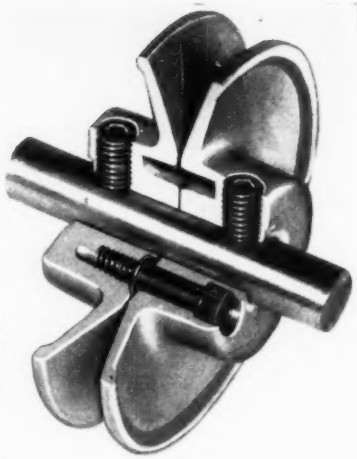
Rubber-bushed bronze bearings and hardened and ground steel studs give flexible yet positive drive for steel and semi-steel couplings. Self-lubrication permits horizontal or vertical installations. Hp ratings at 100 rpm from 1.5 to 1700, torque from 77 to 89250 ft-lb.

Ajax Flexible Coupling Co., Inc., Westfield, N. Y.

Circle number 205 on reader service card

Variable-pitch pulley

V-belt pulley has micrometer adjustment to set pitch to desired rpm required on driven pulley. 3-¼ in. diameter pulleys are available in ½ to ⅝ in. bore sizes, and can be used



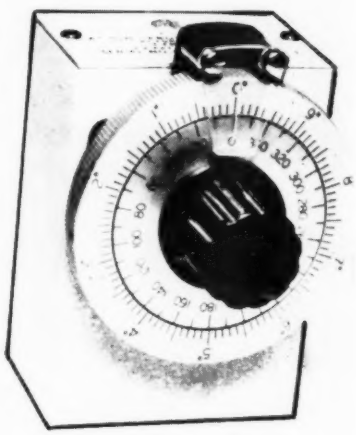
with ⅜, ½ and ⅝ in. topwidth belts. Each half of the pulley is directly fastened to motor shaft, eliminating misalignment. Cap and set screws give adjustment.

Congress Drives Div., Tann Corp., Detroit, Mich.

Circle number 206 on reader service card

Precision drive units

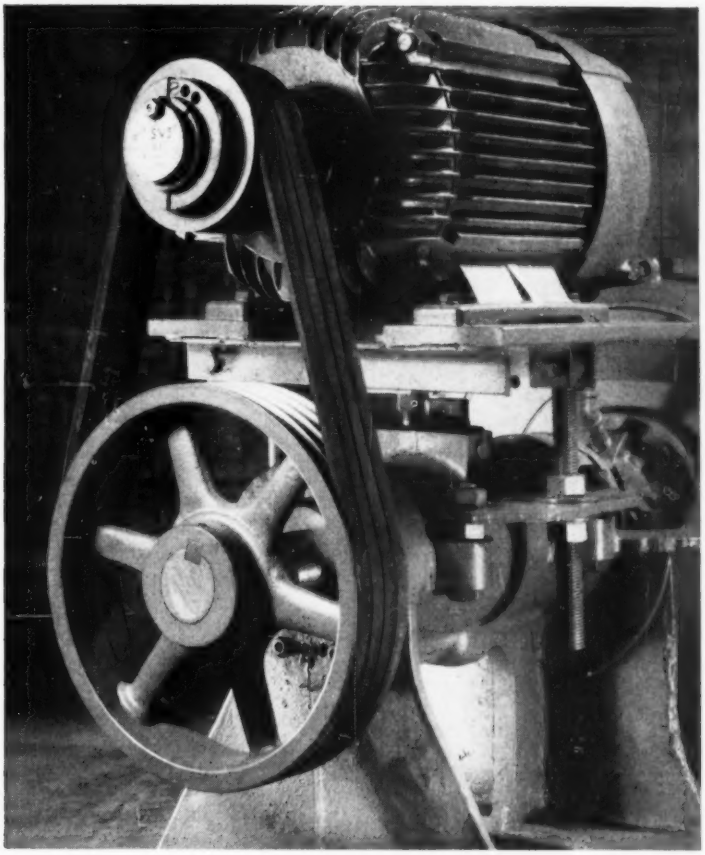
Packaged units eliminate need for buying and assembling separate components like gears, indicators, dials, etc. Type PDW-1 is a worm-



gear-type unit for highest accuracy, with a 180 to 1 ratio for direct dial readings of one minute of arc. Type DSD-2 is a dual-speed precision gear reducer with an inner dial for coarse positioning and an outer dial for fine positioning. Accuracy is six minutes of arc or better.

Acton Laboratories, Inc., Acton, Mass.

Circle number 207 on reader service card



Patented construction eliminates fretting corrosion, freezing and the need for lubrication.

New Wood's "SVS" Variable Speed Sheave won't freeze . . . needs no lubrication!

Wood's new "SVS" variable speed sheave won't freeze . . . needs no lubrication. Positive locking collars, which cannot be over-tightened, securely clamp split flange extensions into place, eliminating fretting corrosion. Patented design features assure quick, easy speed adjustment. You simply loosen the two locking collars and turn the adjusting screw from either side.

Wood's "SVS" is a stationary control, multiple groove sheave which uses standard v-belts and stock driven sheaves. It is of simple, highly efficient design and sturdy construction, accurately balanced to assure smooth operation and long drive life. Installation is easily made on stub or through shafts. Drive capacities range from 10 to 150 horsepower. Get the complete story.

Woods

Write for bulletin 6102

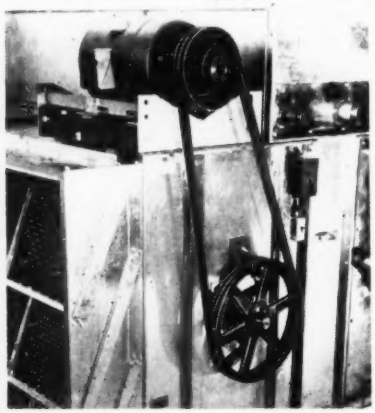
T. B. WOOD'S SONS COMPANY • CHAMBERSBURG, PENNSYLVANIA

ATLANTA • CAMBRIDGE • CHICAGO • CLEVELAND • DALLAS SVS/160

For more information circle No. 41 on Reader Service Card

No-freeze sheave

The "SVS" is a multiple-groove variable-speed sheave for standard V-belts. Positive locking action is said



to prevent even microscopic motion between components, so there's no fretting corrosion. Lubrication isn't needed, and freezing is eliminated because there's no wear and corrosion. Can be used with 2-, 3-, or 4-groove standard stock companion sheaves, and for A-, B-, C-, or D-section V-belts. Variations of pitch diameter: A sheaves 1.1 in., B sheaves 1.4 in., C sheaves 2.2 in., and D sheaves 3.0 in. Capacity range is 5 to 150 hp.

T. B. Wood's Sons Co., Chambersburg, Pa.

Circle number 208 on reader service card

Pillow blocks

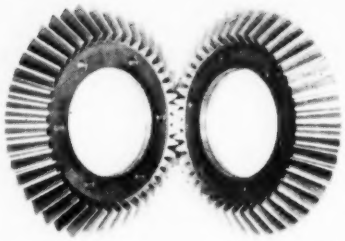
Latest additions to the Link-Belt line of pillow blocks: 14 new sizes in series 1000-Z, solid gray iron housing with bronze bearings; 16 new sizes in series 2-1400 babbitted and 2K-1400Z bronze bearings; 15 new sizes in series 2-1500 babbitted and 2-1500Z bronze bearing. This makes more than 15 types and over 300 sizes of solid, split, gibbed, angle, or flanged pillow blocks for shafting diameters up to 12 in.

Link-Belt Co., Chicago, Ill.

Circle number 209 on reader service card

Bevel gears

FMS spheroid bevel gears are designed for widest possible bevel-gear uses. Straight-tooth design gears have at least two teeth in contact at



all times, and give increased load capacity and smooth, quiet operation. Series A are machined after heat treatment, and are meant for ordinary industrial purposes. Series AA are case-hardened, and give 50 percent higher load capacity.

Braun Gear Co., Brooklyn, N. Y.

Circle number 210 on reader service card

Multi-speed chart drive

With a new chart drive, any of six different chart speeds can be dialed without stopping the chart. There are two models, with overall ratios to 16:1 and 32:1.

Insco Co., Div. of Barry Controls Inc., Groton, Mass.

Circle number 211 on reader service card

WHAT'S YOUR PROBLEM?

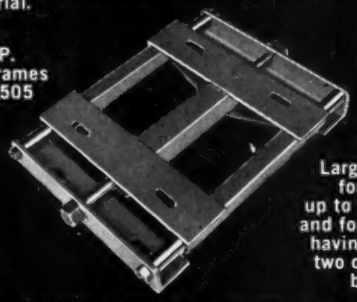
Is it any of the following?

- Diminishing output due to a progressive drop in rpm.
- Too much down-time because of the need for frequent adjustment due to belt stretch.
- Excessive maintenance time and expense.
- Poor belt and bearing life.
- A drive in an inaccessible or isolated location.
- A high-ratio short-center drive.

MOUNTING THE MOTOR ON AN "AUTOMATIC"® BASE MAY PROVE TO BE A SIMPLE AND ECONOMICAL SOLUTION

Motor mounting position and direction of pulley rotation are immaterial.

Stock Sizes
¼ to 125 HP.
for NEMA frames
56 through 505
and 445-U

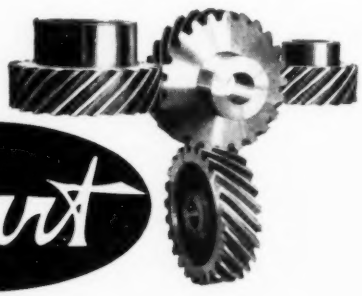


Larger Sizes
for motors
up to 500 HP.
and for motors
having one or
two outboard
bearings.

AUTOMATIC MOTOR BASE CO.
WINDSOR, N. J.

For more information circle No. 1 on Reader Service Card.

EVERY Abart



gear is custom-made

SPUR, SPIRAL, BEVEL, HELICAL, INTERNAL, WORM, RACK, SPROCKET, ETC.

We deliver to your exact specifications

Abart carries no stocks . . . every gear is precision-cut to order. Any type of gear . . . from any material, in any quantity. 96 D. P. to 5/7 D. P.—1/4" P. D. to 18" P. D.

Send B/P and specs or sample for estimate

WRITE FOR ABART GEAR BULLETIN

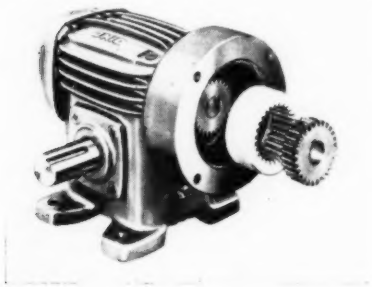
ABART GEAR and MACHINE CO.

4833 WEST 16th STREET • CHICAGO 50, ILLINOIS

For more information circle No. 28 on Reader Service Card

Fin/fan cooled reducers

Fin and fan cooled speed reducers have two types of "C" flanges. One



permits direct connection of the motor shaft to the input shaft; the other has a bell-shaped flange, leaving room for a flexible coupling; both accommodate standard NEMA frames. Sizes range from 1.33 to 5.25 in. center distance; hp ratings from 1/16 to 18.

The Ohio Gear Co., Cleveland, Ohio.

Circle number 212 on reader service card

Sealed roller bearing

Sealed roller bearing for abrasive environments has a dynamic capacity of 13,400 lb. It has 21 crowned

rollers, an ID of 1.750 in., and a spherical OD of 3.3465 in. A buna-N, steel-backed, rubber-bonded seal keeps out dirt and dust.

Rollway Bearing Co., Inc., Syracuse, N. Y.

Circle number 213 on reader service card

Packaged drive system

A packaged adjustable-speed drive system with closed-loop control can be used to maintain automatic cutting speeds on machine tools. The drive package consists of a Reeves Vari-Speed Motodrive mechanical variable-speed drive, Reeves AIRtrol automatic pneumatic control, three-way solenoid valve, position trans-

Choose the Best...

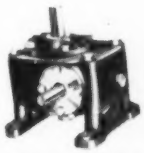
CHOOSE CROFTS "RADIATION"

Standard type, 3" centers

Croft's Universal Mounting Worm Gear Reducers

A range of small, rugged standard worm gear reducers designed for universal mounting to suit any industrial application requiring motors from .01 to 6 h.p. Available from stock in four sizes: 1⅛", 1¾", 2¼" and 3" centers with speed reduction ratios from 5:1 to 60:1. Other ratios can be supplied to order. Replacement parts available from stock. Also available as complete geared motors.

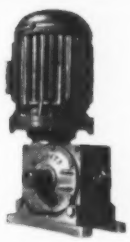
VERSATILITY



Vertical mounting

Inverted mounting

Double reduction worm gear



As a geared motor

Let us know your requirements and we will make recommendations. For general information request Speed Reducer Bulletins B-571 (single reduction), B-5744 (double reduction) and Gearmotor Bulletin B-5914.

CROFTS U.S.A. Inc.

2542 WEST PETERSON AVENUE • CHICAGO 45, ILLINOIS

Phone: ROgers Park 1-0019

EASTERN STATES DISTRIBUTOR

Rockwood Pulley Mfg. Co., Inc. 20 Crosby Street, New York 13, N. Y.

CROFTS CANADA LTD.

2185 Madison Avenue, Montreal 28, P. Q. 25 Jutland Road, Toronto, Ont.

For more information circle No. 7 on Reader Service Card

For more information circle No. 4 on Reader Service Card

DON'T LET THE PRICE FOOL YOU!

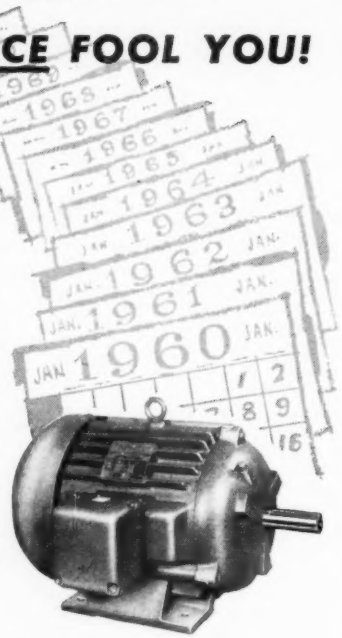
Despite Their Lower Cost

BROOK A.C. MOTORS

Give Outstanding Service

Anybody who knows motors will recognize that there is no finer motor than the Brook. These motors have established excellent service records in industry. Yet, they actually **cost less!**

Space age production methods and extensive distribution in 76 countries makes possible this better motor at lower cost. All standard enclosures. 1 to 600 H.P. Start saving now —look into Brook Motors at once. Write for literature and name of your dealer.



SINCE 1904

BROOK ELECTRIC MOTORS

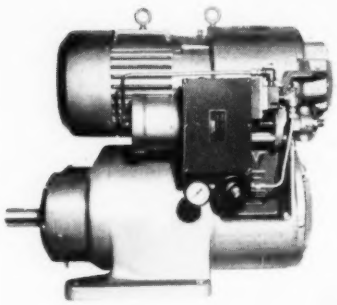
world's most respected motor

BROOK MOTOR CORPORATION

3302-04 W. Peterson Ave., Chicago 45, Ill.

Factory Representatives, Warehouses, Dealers, Service Stations, in Major Cities

In Canada: Brook Electric Motors of Canada Ltd., 250 University Ave., Toronto, Ont.



mitter, manual-automatic remote control station, and filter regulators. Available in ¼ through 40 hp, 1.7 through 4660 rpm, 2:1 through 10:1 speed variations.

Reeves Pulley Div., Reliance Electric and Engineering Co., Columbus, Ind.

Circle number 214 on reader service card

New motor design

A fractional horsepower motor is said to be a totally new design, engineered to highest standards. There are eight models, operating at 3600, 5000,

DIE-CUT ROLLER CHAIN Sprockets

Custom-Made to Your "Specs" for less

- Small lot and production runs.
- Lower tooling, setup and piece costs.
- Practically any shape hole stamped in center of plate sprockets.
- Sprocket assemblies with hubs available; production runs cost less than conventional machined sprockets.
- Keyways included in hubs for very little added cost.

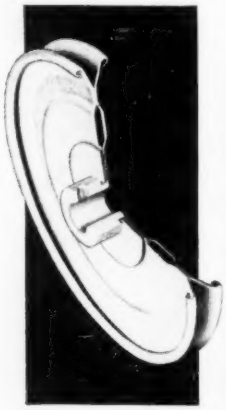
Save with die-cut sprockets made by the Dayton Rogers method.

Write for complete details including representative costs.

DAYTON ROGERS *Manufacturing Company*

Minneapolis 7Z, Minnesota

For more information circle No. 24 on Reader Service Card



Specify Strong Smooth Safe SALEM

COPPER BRAZED

FORMED STEEL PULLEYS

for your power transmission

Engineered for Lawn Mowers, Garden Tractors, Compressors, Agricultural and Industrial Equipment. Smooth rolled edges reduce belt wear. Solid steel discs and hubs weather heavy loads and high speeds.

Write for Engineering booklet to help you specify your Pulley requirements.

SALEM STAMPING & MFG. CO., INC.

DEPT. 16 SALEM, OHIO

For more information circle No. 18 on Reader Service Card

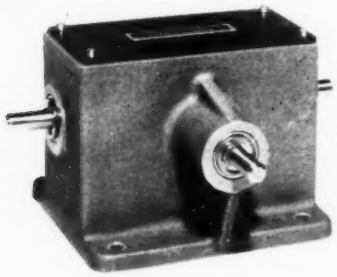
7500, or 10,000 rpm; hp ratings are 1/10, 1/12, 1/15, 1/18, 1/20, 1/25, 1/35; universal, shunt, or series from 12v. to 220v. input.

Carter Motor Co., Chicago, Ill.

Circle number 218 on reader service card

Bevel gear boxes

A range of "BA-5" heavy-duty bevel gear boxes has these permutations and combinations: ratio, 1:1 to 3:1;



shaft size, 1/8 to 1/4 in. diameter; ball bearing and/or oil-less bearings; variable shaft outputs and inputs.

PIC Design Corp., East Rockaway, N. Y.

Circle number 219 on reader service card

Size E motoreducer

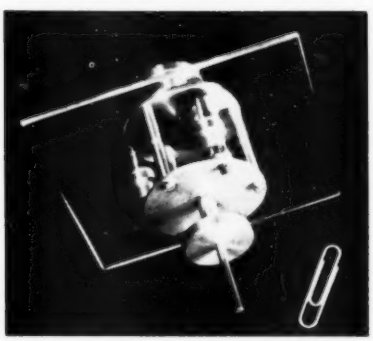
Size 8E is the latest addition to the All-Motor Motoreducer line. The drive is designed for tough jobs in the lower speed ranges. Output speeds range down to 1 rpm, hp up to 75.

The Falk Corp., Milwaukee, Wis.

Circle number 220 on reader service card

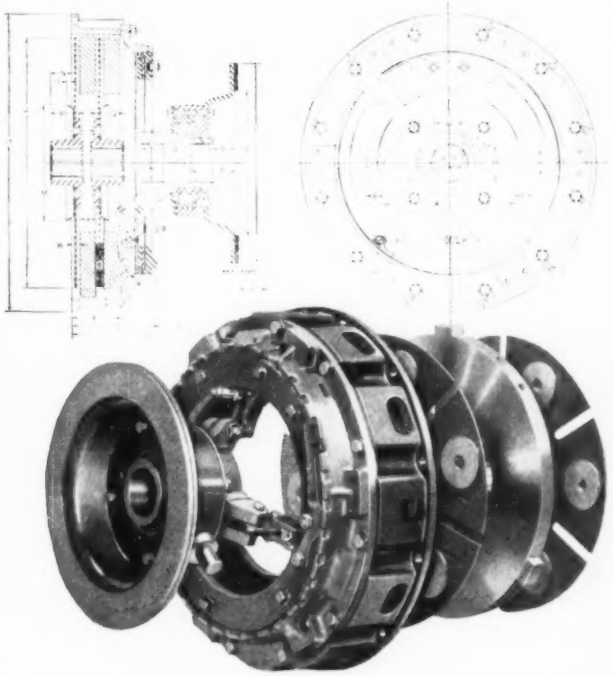
Hermetic shaft seal

For vacuum or high-pressure service, a hermetic rotary shaft seal can operate at cryogenic temperatures, or up to hundreds of degrees F. Rotary



motion of input shaft moves slotted arms of torsional shaft, causing torsion shafts to oscillate. Oscillating motion can be hermetically sealed

ROCKFORD



Small Spring Loaded

Automotive Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Light Over Center

Power Take-Offs

Speed Reducers

Greater Power With Less Size from a DOUBLE PLATE Clutch

This Heavy-Duty ROCKFORD Morlife CLUTCH, used in a large crawler-type tractor, provides more torque capacity than previous clutches of the same diameter. More service life and more heat resistance makes this clutch perfect for all heavy-duty type machines. A heavy-duty brake plate is mounted on the ball bearing type release sleeve. If you have a heavy-duty vehicle in the planning stage, it will pay you to learn about these and other advantages of this new clutch—before you design the drive line. A design study of your present drive lines might indicate advantages of using this Heavy-Duty ROCKFORD CLUTCH.

SEND FOR THIS HANDY BULLETIN

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD Clutch Division BORG-WARNER

321 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

ROCKFORD B-W BORG-WARNER

CLUTCHES

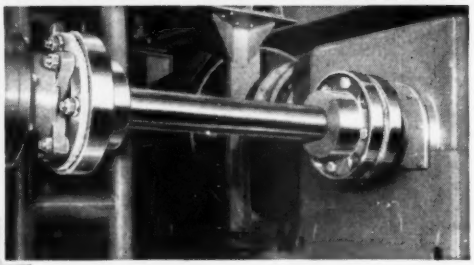
For more information circle No. 29 on Reader Service Card

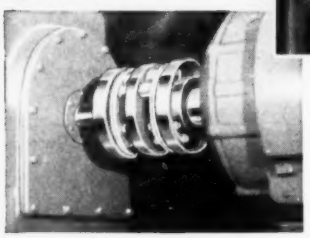
For more information circle No. 31 on Reader Service Card

For Power Transmission Without Maintenance Use

THOMAS FLEXIBLE COUPLINGS

NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS





Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

Under Load and Misalignment only Thomas Flexible Couplings offer all these advantages:

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth, Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for engineering catalog 51A, and the name of your nearest Thomas representative

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

PRODUCTS *continued*

with flexible torsion tubes which are bonded to shaft at one end and to wall of enclosure or bulkhead at the other end. For most applications, a bonded flexible material, such as neoprene, can be used; an all-metal seal is used for extreme temperatures or pressures.

Co-Engineering Co., Mountain Lakes, N. J.

Circle number 221 on reader service card

No-lubrication bearing

Self-aligning spherical bearing has a low coefficient of friction (.4) without use of lubricants, such as film, graphite, or molybdenum disulphide. A surface coating of Teflon is bonded to the outer raceway, making the bearing suitable for low surface speeds, high unit loads, or high dynamic loading where metal-to-metal life is limited by fretting or brinelling.

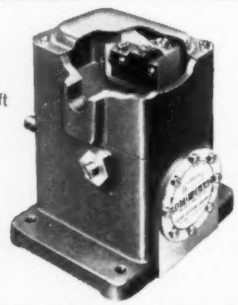
Radial Bearing Corp., Danbury, Conn.

Circle number 222 on reader service card

NEW

ROTO-GUARD*

SHAFT MOTION INDICATOR



Connects to rotating shaft

Actuates warning lights or other signals. Operates control switches.

PROVIDES positive indication of drop in speed or stopping of machinery
PROTECTS conveyors • elevators • feeders • belt conveyors
OPERATING SPEEDS of 10 to 150 rpm make the **ROTO-GUARD** applicable to automatic protection of slow-moving machinery used in material handling and similar systems
RUGGED AND COMPACT: approx. 5" x 6" x 6".

SIMPLE • POSITIVE • RELIABLE • LOW COST

A Development of
THE BIN-DICATOR COMPANY
13946-E3 Kercheval • Detroit 15, Michigan
Specialists in Automatic Control Devices for Material Handling Systems for Over 20 Years

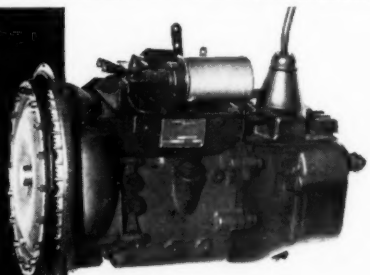
Write for Bulletin RG-16

*TRADE MARK

WE SELL DIRECT • PHONE ORDERS COLLECT

For more information circle No. 2 on Reader Service Card

FUNK MODULAR POWER UNITS



CONTROL BOTH SPEED AND DIRECTION

On this Scoopmobile "Mixermobile," a FUNK Revers-O-Matic® Drive instantly and smoothly changes both speed and direction of travel with just one lever.

The FUNK torque converter automatically adjusts power to speed and load. A 4-speed transmission helps hustle heavy loads.

Just one example of how FUNK MODULAR POWER UNITS may be combined — in an unlimited number of arrangements — *without* special engineering costs.

Let FUNK help solve your power transmission problem.

FUNK MFG. CO. Box 577-G, Coffeyville, Kansas

For more information circle No. 12 on Reader Service Card

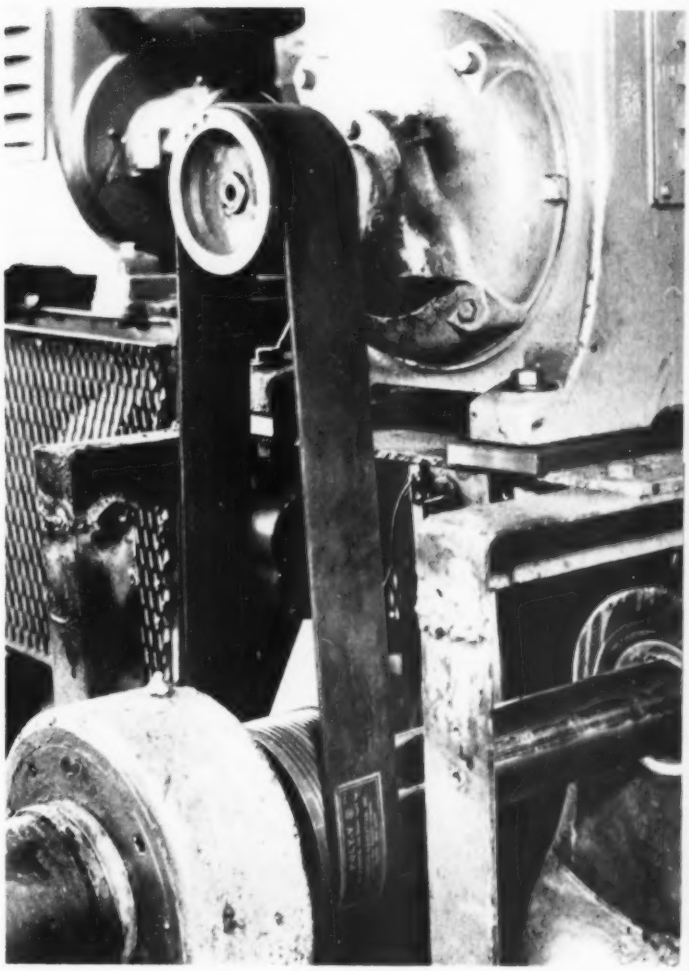
DESIGN
IDEAS
FROM THE FIELD

Multi-rib belt eliminates vibration

VIBRATION was reduced on a spinning lathe when the flat leather belt on the work spindle was replaced by a multiple-ribbed belt. The spinning lathe is used to smooth wrinkles out of tapered metal shapes.

The multiple-rib belt is 2¼ in. wide; the flat belt was 3-in. wide. Driving sheave is 4-in. PD; driven sheave is 6-in. PD. Input from a variable-speed, 3-hp motor gives maximum belt speed of 4200 fpm.

This conversion was made by *The Belmont Co.*, New Philadelphia, Ohio.

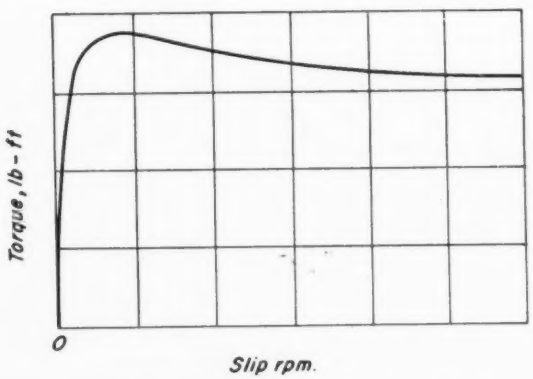


MULTIPLE-RIB belt on spinning lathe.

IDEAS *continued*

Eddy-current couplings

CONTROLLED TENSION in a winch drive is provided by two eddy-current couplings. Controlled tension is necessary to prevent damage to a blimp from high wind gusts.

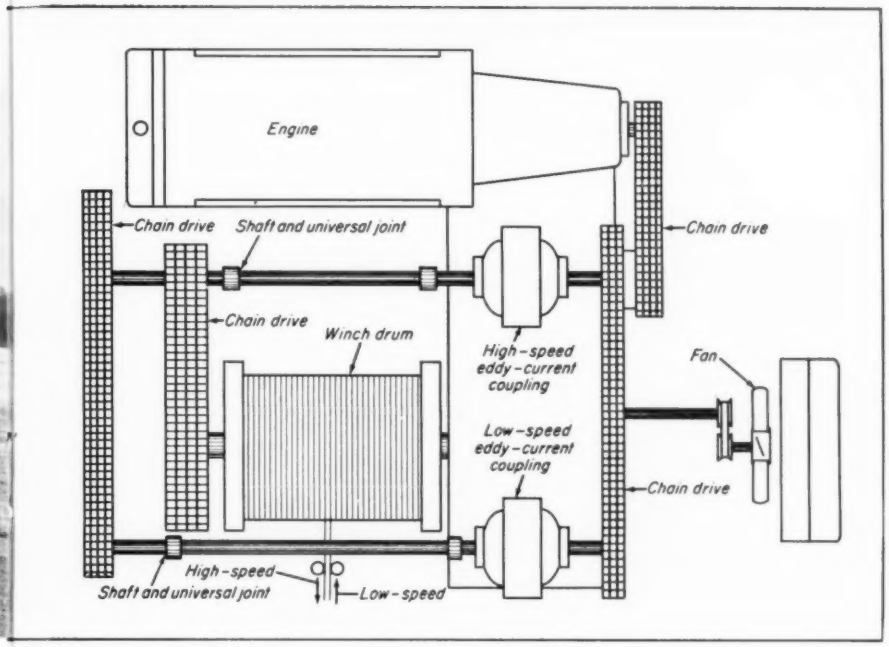


NEARLY CONSTANT TORQUE over a wide speed range makes eddy-current couplings ideal for maintaining constant tension on a winch cable. With constant input speed to the coupling, slip rpm equals this constant value minus output rpm.

The complete winch consists of a 53-hp gasoline engine with a governor to operate at 1300 rpm; two eddy-current couplings driven by chain from the engine; chain drives from the couplings to the winch drum to give appropriate reductions for mooring, launching, and docking; and a disconnect clutch for disconnecting the low-speed drive when the high-speed drive is operating. When the low-speed drive operates, excitation of the high-speed coupling is reduced to zero.

Outputs of the system are; maximum speed of 100 fpm with line tension limit of 8000 lb for mooring, and 600 fpm with line tension of 1600 lb for launching. The drive is not reversible, although winch drum rotation reverses. Rotation of the drum is due to line pull during launching when airship lift exceeds the tension setting of the drive.

Two eddy-current couplings, one for docking and one for launching, prevent excessive speed of the output member of the low-speed coupling during launching. Reduced tension needed for launching might be had by using only one coupling and reducing the excitation. But, the speed reduction built-in to provide sufficient tension for docking would result in speeds far above design speed of the coupling when the cable is pulled out at 600 fpm by the airship.

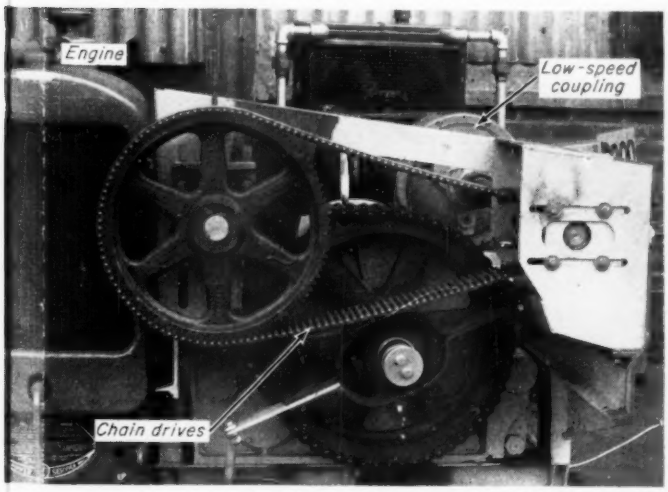


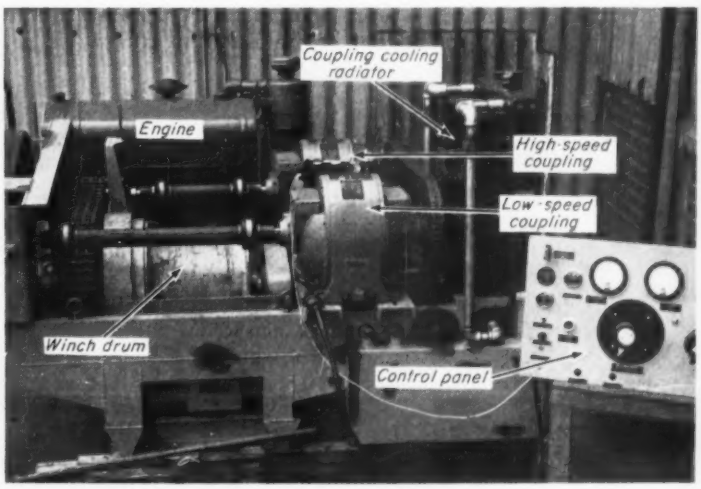
SCHEMATIC DIAGRAM of winch drive.

s keep cable tension constant

Eddy-current coupling has characteristic ability to maintain nearly constant torque over a wide range of speeds. The accompanying curve for a typical unit illustrates this.

Mobility is achieved by mounting the winch on a four-wheeled vehicle. The entire unit is labelled airship ground handling vehicle by its designers and builders, *Goodyear Aircraft Corp.*, Akron, Ohio.

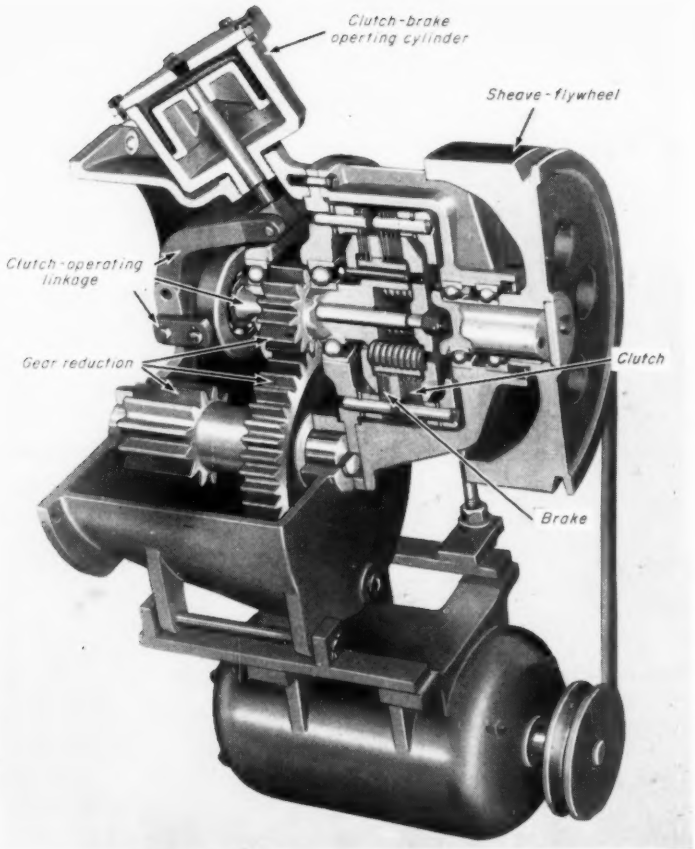




WINCH UNIT before mounting on the ground handling vehicle.

IDEAS
continued

Cylinder actuates clutch and brake inside gear box



CUTAWAY VIEW of packaged press drive unit.

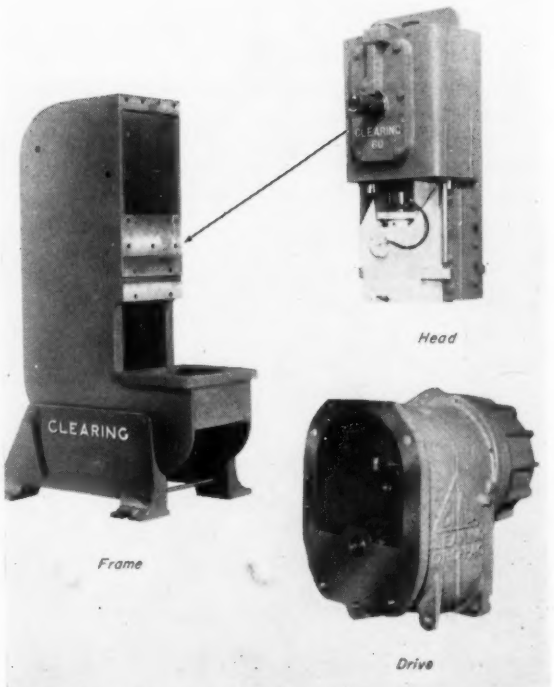
NEW PACKAGED DRIVE has the clutch and brake built right inside the speed reducer on a line of heavy presses. The same drive can be used on all press models from 22, 32, 45, and 60 ton capacity.

Brake, clutch, and reduction gears are all sealed inside the housing and lubricated by sealed-in oil.

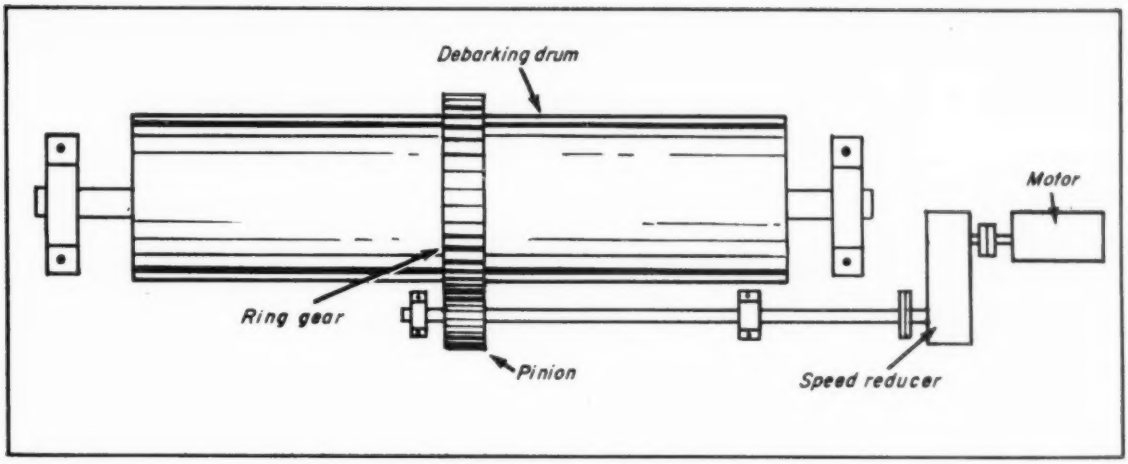
Clutch and brake units are made up of alternating stationary and rotating bronze plates. An external air-powered actuator engages the clutch and disengages the brake when 65-70 psi air is applied. When pressure is released, internal springs apply the brake and disengage the clutch. Oil in the clutch and brake units cushions initial contact. Metal-to-Metal contact does not occur until speeds of the rotating parts are almost equal.

Clutch and brake units are between a flywheel and reduction gearing to minimize torque handling requirement of these units. The motor mounted integrally with the drive package and connected by belt. Actual life has not yet been determined since none of the units have worn out since the design went into service.

Clearing Div., U. S. Industries Inc., Chicago, Ill., are designers and builders of the power package and the presses on which it is used.



DRIVE UNIT, frame, and head for Tore-Pac presses.



SCHEMATIC DIAGRAM of improved barking drum drive.

Speed reducer ups efficiency to 97%

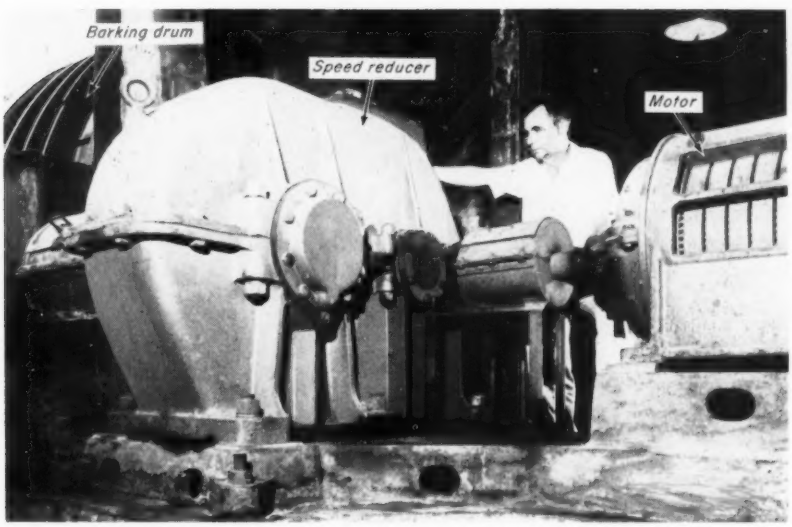
SPEED REDUCER improved the efficiency of a barking drum drive by 22%. Before the conversion, 150-hp, 860-rpm motor drove the barking drum through a 20-in. wide leather belt and countershaft on which a pinion was mounted, a bullgear on a shaft running alongside the drum which meshed with the pinion on the countershaft, and a pinion on the shaft alongside the drum which meshed with a ring gear around the drum to give final speed of 6.5 rpm. Overall efficiency was 75%.

Countershaft, belt, and one gear set were eliminated by the speed reducer which connects the motor directly to the shaft running alongside the drum. The reducer has a ratio of 15.3:1, output speed and torque of 55 rpm and 171,885 in.-lb. New system efficiency is 97%.

Another advantage of this system is increased safety due to elimination of the belt and countershaft, even though they were well guarded.

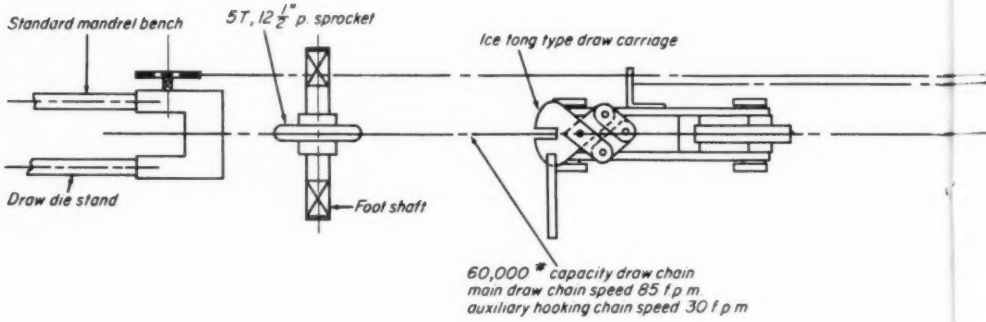
The barking drum weighs 50 tons empty and holds about 50 tons of logs. Drum is 45 feet long and 12 ft in diameter. Teeth inside the drum skin off the bark as the drum revolves with its load of logs inside.

F. L. Fulghum Co., Atlanta, engineered this installation for the Brunswick Pulp and Paper Co., Brunswick, Ga.



GEAR REDUCER INSTALLATION on barking drum drive.

IDEAS
continued


Standard mandrel bench
5T, 12 1/2" p. sprocket
Ice tong type draw carriage
Draw die stand
Foot shaft
60,000 # capacity draw chain
main draw chain speed 85 f.p.m.
auxiliary hooking chain speed 30 f.p.m.

Electric controlled air clutches select speeds automatically

AIR CLUTCHES, electrically-controlled, automatically engage and disengage three drives on a tube-sizing draw bench. The three a-c drives provide three different speeds for the draw carriage.

Main drive is a 125-hp, 1160-rpm, ac induction motor driving into a 31.7:1 speed reducer. Output of the reducer connects through one air clutch to a quadruple roller chain drive with reduction of approximately 2-1/4:1 which drives the main draw chain. This provides 60,000 lb for drawing at a speed of 85 fpm.

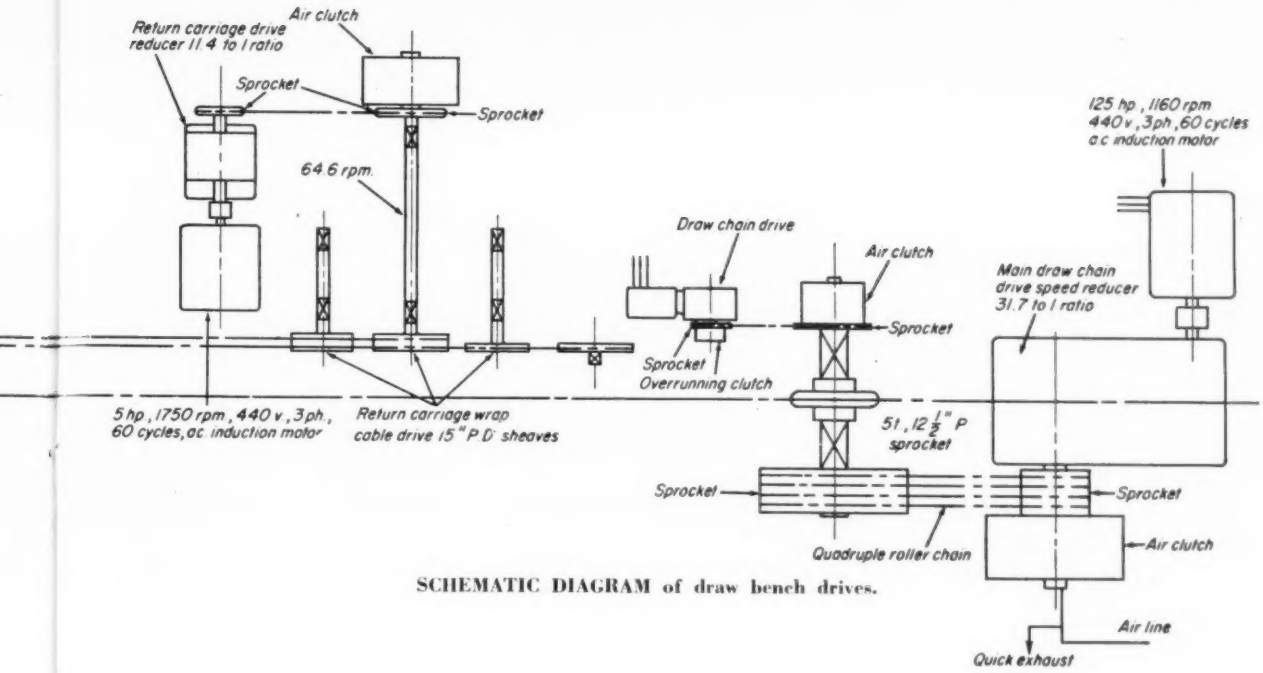
Second drive is a 3 hp ac gearmotor with output speed of 15 rpm driving the draw chain through an over-running clutch and chain drive with 2.65:1 reduction. This provides a speed of 30 fpm for hooking the draw carriage to the draw chain. An air clutch is also used to engage and disengage this drive.

Third drive is the carriage rapid return drive. This consists of a 5-hp, 1750-rpm, induction motor driving an 11.4:1 reducer, an air clutch, and chain drive with approximately 2.4:1 reduction. Connection to the draw carriage is by cable running alongside the drawbench.

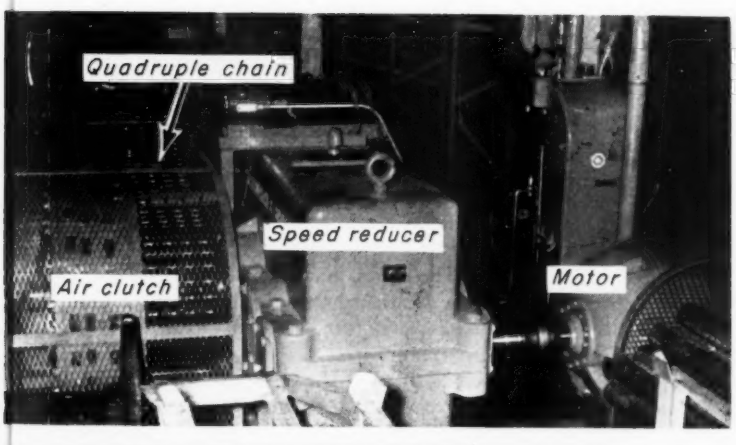
Operating sequence starts with the draw carriage at its furthest point from the draw die stand. The operator pushes the *Return* button which engages the rapid return drive. The cable then moves the draw carriage toward the mandrel bench at 250 fpm. When the carriage is 6 ft from the mandrel bench, limit switches declutch carriage return drive and the main drive, and engage the auxiliary drive.

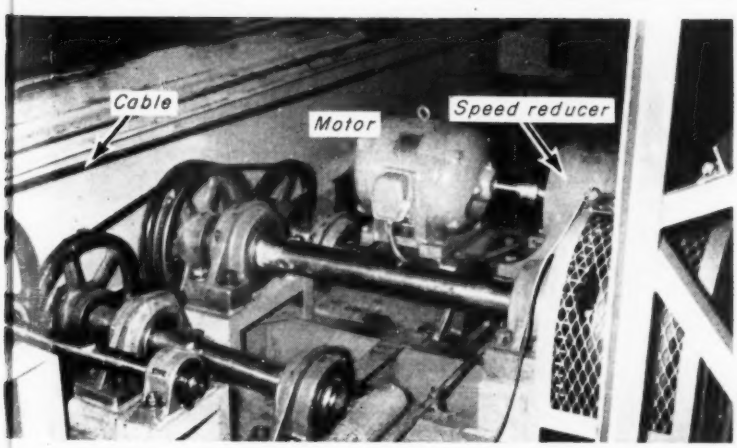
When the carriage is within a few inches of the draw die stand, a plunger contacts the stand and drops the hook. When the hook engages, the carriage starts to move at slow speed in the draw direction. The increased load on the auxiliary drive from the carriage operates the load sensitive control to disengage the auxiliary drive and engage the main drive. Overrunning clutch in the auxiliary drive assures smooth load transfer from auxiliary to main drive. Drawing then proceeds at 250 fpm until the tube clears the drawing die. The tube is then automatically released by the *ice-tong* clamp on the draw carriage and the cycle can be repeated.

Co-inventors of this drawbench are Ernest A. Hund, chief engineer, and Oliver L. Bardes, *Bardes Corp.*, Cincinnati, Ohio. The machine is used in the Bardes plant to draw small tubing used in the manufacture of wiring devices. Patents have been applied for.

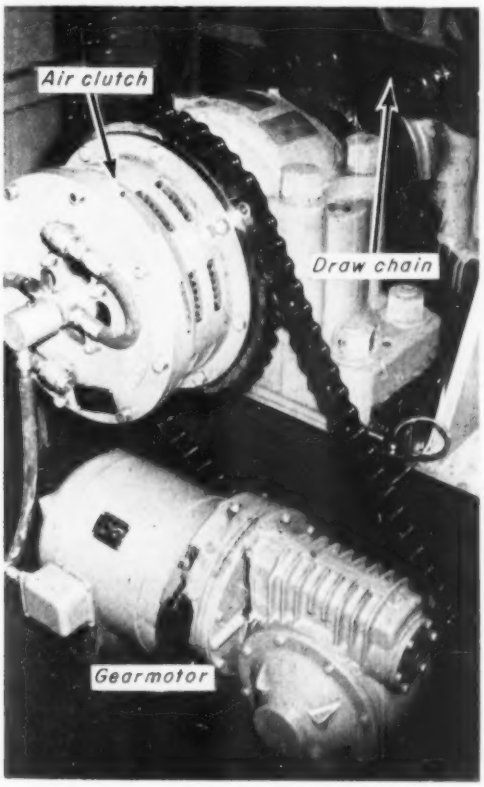


SCHEMATIC DIAGRAM of draw bench drives.

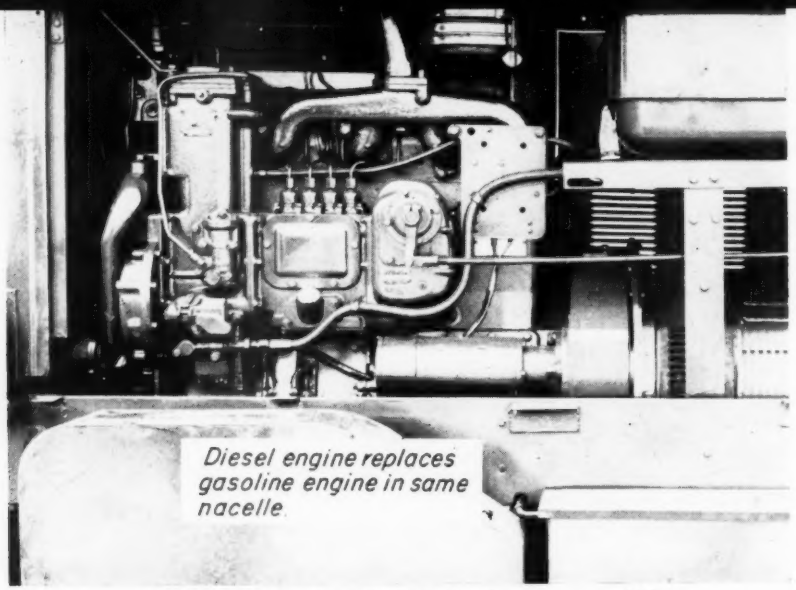




MAIN DRIVE (Left).
CARRIAGE RETURN DRIVE (Lower Left).
AUXILIARY DRIVE (Below).



IDEAS
continued



GROUND POWER UNIT with diesel engine installed.

Diesel engine improves ground power unit

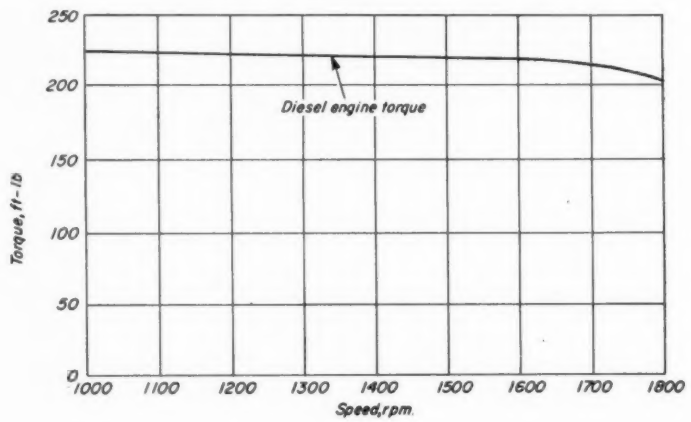
DIESEL engine replaces a gasoline engine to drive a 28 v generator that starts turbo-prop aircraft engines. Many installations are on mobile units used with Vickers Viscount and other commercial aircraft.

Benefits of the diesel installation are: fuel used is the same as that used in the Rolls-Royce aircraft engines, and a 20-gal tankful of diesel fuel will last 24-hr shift where 20 gal of gasoline was only enough for 8 hr; fuel cost is reduced by fuel consumption rate and cost per gal. Diesel fuel cost is about 40% of that of gasoline. Total fuel cost for 24 hr. operation is thus about 15% of that for the gasoline engine.

Primary advantage of the diesel engine is its ability to operate dependably over long periods of time without replacement of ignition and fuel system components. Users of the unit said that although the gasoline engine seemed to be in good running condition, experience showed that unless ignition and fuel system were in tuned-up condition, the engine would stall when peak power of 1500 amp was needed for starting the turbo-prop aircraft engines.

66-hp diesel engines are now used and replace 115-hp gasoline engines. The diesels have a flatter torque-speed curve and better inherent lugging ability.

This conversion was engineered by Raymond C. Fisher, development technician of ground equipment, *Capital Airlines*, Washington, D. C. Units are used at all Capital bases.



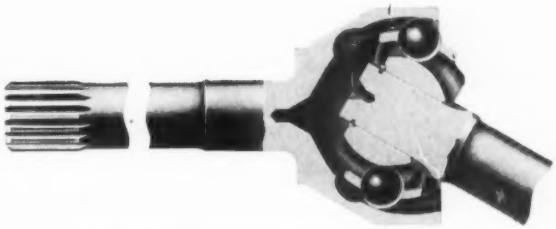
TORQUE CURVE for the diesel engine illustrates the ability of the diesel to lug, or maintain torque at low engine speeds.

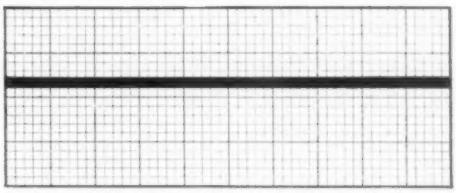
RZEPPA Universal Joints Transmit Torque Smoothly—*Even At High Angles!*

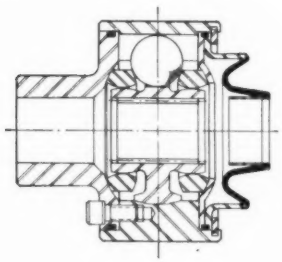
Rzeppa universal joints transmit 100% precision-smooth torque continuously—at angles of 35° and higher! Constant velocity action completely eliminates chatter, roughness and vibration. Size for size, you get longer shaft and bearing life, higher torque capacity with Rzeppa joints than with any other type!

The secret of Rzeppa's uniform power flow is that the driving balls are always in the bisecting plane of the driving and driven shafts. No matter what the shaft angle, torque flows evenly at constant velocity.

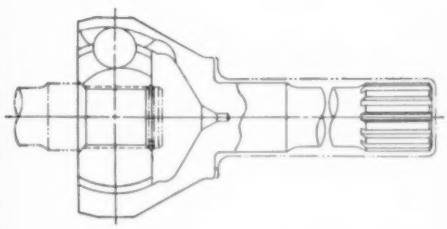
Rzeppa constant velocity joints are available in a wide variety of sizes, styles, angles and speeds. Rzeppa joints have been used successfully in equipment ranging from giant road-building and mining equipment to the most intricate aircraft and missile applications.



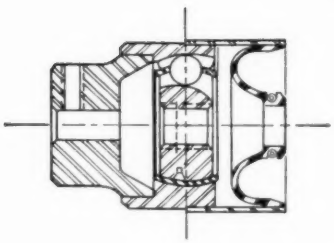




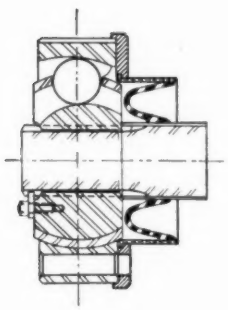
"MX" Type CV Joint (⅞" to 3½" swing diameter) . . . designed primarily for high speeds, low angles . . . blowers • compressors • servo motors • pumps • control devices • frequency converters • missiles • aircraft • dynamotors



Bell-Type CV Joint (15/16" to 2½" axle shaft diameters) . . . designed for high-angle driving steering axles used in road building machinery • mining machinery • industrial • automotive applications



"OV" Type CV Joint (2⅛" maximum swing diameter) . . . designed for smaller applications . . . ordnance • machine tools • servo mechanism • farm equipment • automotive equipment



Disc-Type CV Joint (from 2⅛" to 16¼" swing diameter) . . . designed for all types of industrial drive applications where constant velocity and trouble-free service are required.

WRITE

for this new engineering data folder on the complete line of Rzeppa constant velocity joints. No cost or obligation to you.

Please send my copy of Con-Vel's NEW engineering data folder on CV universal joints.

Name_____ Title_____

Company_____

Street_____

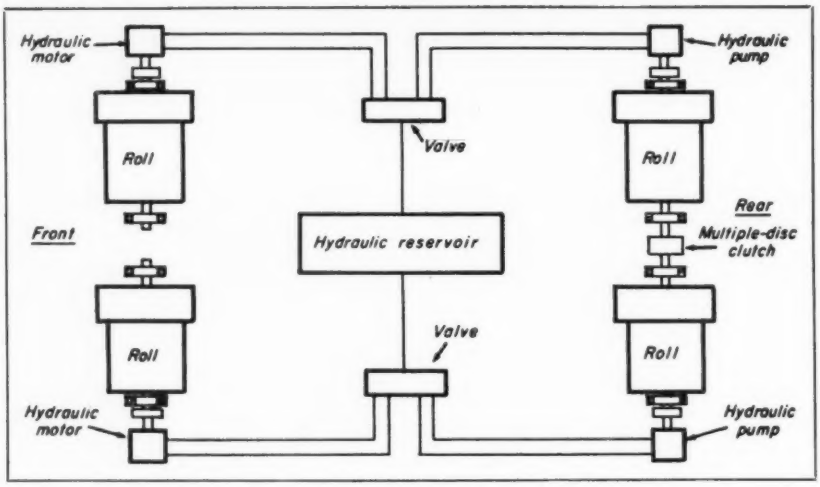
City_____ State_____

DANA Con-vel

CON-VEL DIVISION
DANA CORPORATION
3901 Christopher
Detroit 11, Michigan

For more information circle No. 30 on Reader Service Card

IDEAS
continued



ROLL TESTER DRIVE schematic diagram.

Hydraulic drives simulate road loads

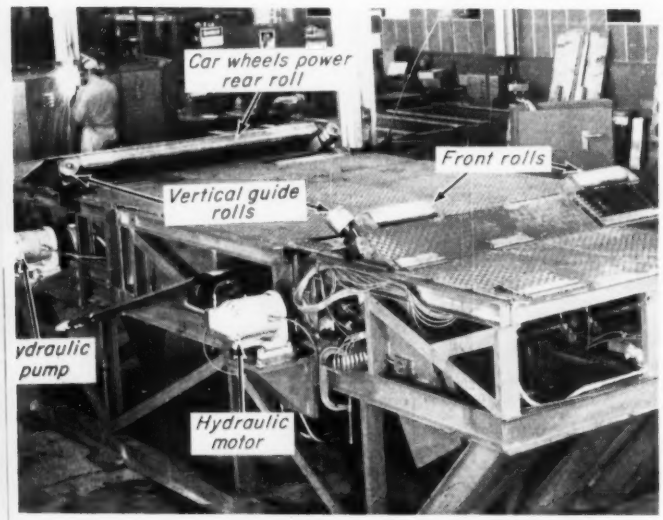
POSITIVE-DISPLACEMENT PUMPS driven by a test car's rear wheels power hydraulic motors that drive the front wheels with simulated road loads. The hydraulic system also loads the engine and transmission system of the car. Driving, steering and braking tests can be accomplished.

Fast road testing of Chevrolet's new compact car, the Corvair, is done right at the end of the assembly line on the roll test machine. The drives simplify transmission of power from rear to front wheels.

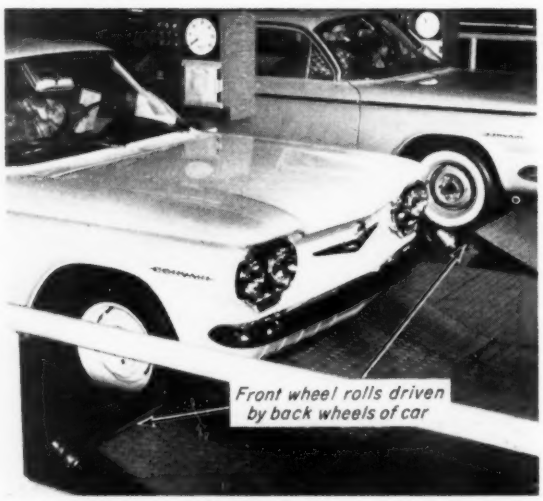
During *drive* portion of the cycle, rear wheel rollers are connected by an electro-magnetic clutch. For brake testing, the car is driven up to 30 mph; the clutch connecting the rear wheels is disengaged, hydraulic units unloaded, drive train disengaged and the brakes applied. Deceleration rate of each roll is recorded on a strip chart. If the charts show that braking is not uniform, adjustments are then made.

Vertical guide rolls prevent the car from being steered off the rolls during test. Inertia rolls have a *bounce* pattern on their surfaces to provide a certain amount of bumping and jarring during the test. This causes bearings and bushings in the front suspension to assume their normal position and thus makes subsequent front wheel alignment more accurate. The complete test takes two minutes.

Roll tester was designed and built by *George L. Nankervis Co.*, Detroit, Michigan.



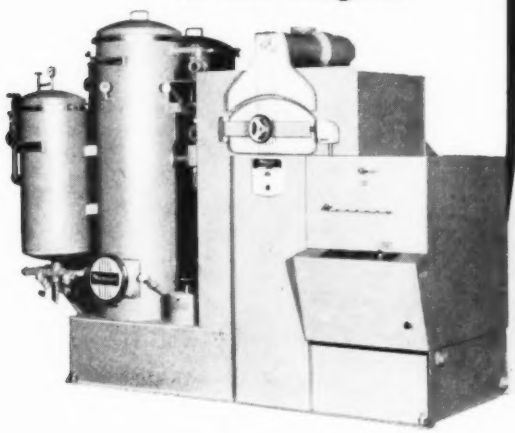
ROLL TEST MACHINE on assembly floor.

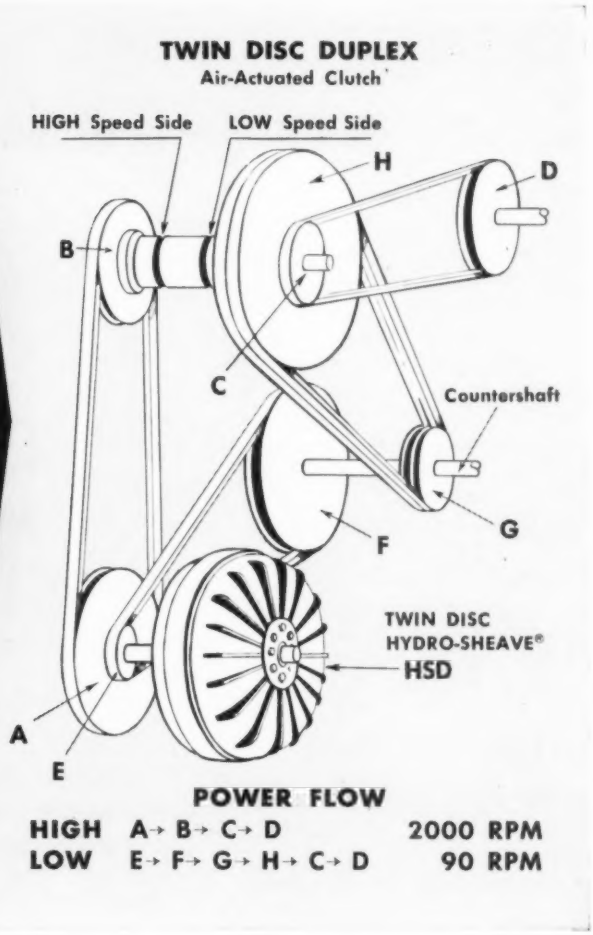


TWO CORVAIRS ON TEST. Machine is installed below floor level so cars can be driven from the assembly line.

Twin Disc helps solve tricky transmission problem

(and saves plenty of space in the bargain)





Designing the drive for a washer-extractor dry cleaning system is no simple matter. The reason, of course, is the wide variation in speed required for the two cycles—low for washing, high for extracting.

Engineers at Mercury Cleaning Systems, Inc. of Evanston, Illinois hit on a novel and effective solution to this problem in designing their new Model PER 50 Numatic cleaning unit. With power supplied by a 2 hp, 1750 rpm electric motor, a 3" Twin Disc Duplex Clutch was selected to effect the speed change. This tiny clutch is air-actuated to eliminate adjustment problems—wear take-up is automatic.

When one side of the clutch is engaged, the washer basket is driven at 30 rpm for the cleaning cycle. Engaging the other side produces 600 rpm for the spin-dry cycle.

This rapid acceleration—plus the heavy inertia of wet clothes—presented a high energy problem for the clutch and an overload problem for the motor. Both were solved by a Twin Disc 7.4S HYDRO-SHEAVE Drive. When the shift to the spin-dry cycle imposes a heavy overload, fluid "slip" within the coupling permits the motor to stay up to speed instead of being dragged down. The clutch is also able to engage much more quickly. Thus the energy load is dissipated within the fluid coupling instead of producing heat and resultant friction plate wear. The HYDRO-SHEAVE is furnished with quick-detachable mounting provision for a wide range of standard sheaves.

This installation is a good example of how Twin Disc friction and fluid drives give top performance in all types of industrial machinery. For details about the complete Twin Disc line, write for Bulletin 314. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.

TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

For more information circle No. 21 on Reader Service Card

LITERATURE *on drives and components*

Shaft motion indicator

Bulletin RG-16 describes indicator that connects to rotating shaft and actuates warning lights or other signals when speed drops.

Bin-Dicator Co., Detroit, Mich.

Circle number 2 on reader service card

AC motors

Literature tells about lower cost motors from 1 to 600 H.P.

Brook Motor Corp., Chicago, Ill.

Circle number 4 on reader service card

Bearings

General catalog 158 lists cast bronze and sintered bronze stock bearings and bars and bearing aluminum bars.

Bunting Brass and Bronze Co., Toledo, Ohio.

Circle number 5 on reader service card

Custom-made gears

Get the facts on custom-made gears and gear boxes.

Cincinnati Gear Co., Cincinnati, Ohio.

Circle number 6 on reader service card

Speed reducers

Bulletin B-571 gives general information on single-reduction speed reducers designed for universal mounting.

Crofts U.S.A. Inc., Chicago, Ill.

Circle number 7 on reader service card

Roller chain, sprockets

Catalog tells how roller chain and sprockets shorten development time, and cut costs.

Diamond Chain Co., Inc., Indianapolis, Ind.

Circle number 8 on reader service card

V-belts

If you have a V-belt problem that requires special attention and service, get this data.

Durkee-Atwood Co., Minneapolis, Minn.

Circle number 9 on reader service card

Shaft-mounted speed reducers

There are 55 models of the Torque-Arm shaft-mounted speed reducer that needs no foundation, sliding base, or flexible coupling. Bulletin gives details.

Dodge Mfg. Corp., Mishawaka, Ind.

Circle number 11 on reader service card

Transmission equipment

Four catalogs describe flexible couplings, variable speed pulleys, universal joints, and take-up frames.

Lovejoy Flexible Coupling Co., Chicago, Ill.

Circle number 14 on reader service card

Chain manual

Conveyor chain manual and design engineer's handbook shows all types and sizes of standard chains.

Moline Malleable Iron Co., St. Charles, Ill.

Circle number 16 on reader service card

Roller bearings

This 44-page engineering reference manual lists complete line of roller bearings, plus full specifications on cam followers and yoke rollers.

Orange Roller Bearing Co., Inc., Orange, N. J.

Circle number 17 on reader service card

Steel pulleys

Copper brazed formed steel pulleys are detailed in engineering booklet.

Salem Stamping & Mfg. Co., Salem, Ohio.

Circle number 18 on reader service card

Motor speed control

Get details on this way to get the full possible advantage of speed control in dc motors while operated from the regular ac power line. Feedback circuits provide constant torque.

Servospeed Div., Electro Devices, Inc., Paterson, N. J.

Circle number 19 on reader service card

Self-aligning bearings

40-page catalog describes standard and special self-aligning sleeve type bearings.

Triangle Mfg. Co., Oshkosh, Wis.

Circle number 20 on reader service card

Clutches, fluid drives

Bulletin 314 gives details on the complete line of friction clutches and fluid drives for all types of industrial machinery.

Twin Disc Clutch Co., Racine, Wis.

Circle number 21 on reader service card

Variable speed drive

Catalog tells how a finger's touch sets control lever of this stepless variable speed drive from zero to 2000 RPM.

Zero-Max Co., Minneapolis, Minn.

Circle number 23 on reader service card

Toothed belt drive

Catalog GB-201 gives data on the Gearbelt drive that combines the positive action of gears with the flexibility of belts.

Browning Mfg. Co., Maysville, Ky.

Circle number 25 on reader service card

V-drives

Catalog B-60 gives details on the Super-Wedge drive and other Maurey drives.

Maurey Mfg. Corp., Chicago, Ill.

Circle number 26 on reader service card

Cut-to-order gears

Bulletin describes how all these gears are custom-made, including spur, spiral, bevel, helical, internal, worm, rack, sprocket, etc.

Abart Gear and Machine Co., Chicago, Ill.

Circle number 28 on reader service card

Clutches, power take-offs

Bulletin shows typical installations of clutches and power take-offs, with diagrams of unique applications, capacity tables, dimensions, and complete specifications.

Rockford Clutch Div., Borg-Warner Corp., Rockford, Ill.

Circle number 29 on reader service card

Constant velocity joints

Engineering data folder describes the complete line of Rzeppa constant velocity joints, to transmit torque smoothly even at high angles.

Con-Vel Div., Dana Corp., Detroit, Mich.

Circle number 30 on reader service card

Creative editorial makes reading more worthwhile

POWER TRANSMISSION DESIGN is edited exclusively for designers and plant operating management concerned with mechanical power transmission.

Its specialized editorial includes design details and techniques, application ideas, new developments, modernization and maintenance information. Its full-time staff of professional engineering editors has 142 years' experience.

These editors travel thousands of miles covering major marketing areas in the United States . . . talking to important people . . . visiting almost every kind of industrial operation where power transmission is at work, or being worked on. They report on power transmission developments as they happen.

Reading POWER TRANSMISSION DESIGN each month keeps you abreast of the latest happenings in the world of mechanical power transmission. It's designed to help men like yourself do a better job.

Power Transmission Design

Published by Power Publishing Company, Inc.
Subsidiary of The Industrial Publishing Corporation
812 Huron Road • Cleveland 15, Ohio • SUperior 1-9620
Sales Offices: New York • Chicago • Los Angeles • London, England

FRANCHISE CIRCULATION — *Franchise Circulation gets magazines to the men who buy*

DISTILLED WRITING — *Distilled Writing gets magazines read*

Flexible couplings

Engineering catalog 51A tells how you can get power transmission without maintenance with flexible couplings.

Thomas Flexible Coupling Co., Warren Pa.

Circle number 31 on reader service card

V-belt drives

Handbook of V-belt drive design (#230-B) tells how to calculate Cog-Belt drives.

Dayton Industrial Products Co., Melrose Park, Ill.

Circle number 34 on reader service card

Universal joints, drives

Engineering bulletin has 16 pages of universal joints and drives, from light-duty joints through medium and heavy-duty industrial and power take-off drives.

Neapco Products, Inc., Pottstown, Pa.

Circle number 50 on reader service card

Transmission

Catalog sheet gives engineering data and specifications of a variable speed transmission with ratios 3:1 to 9:1 and basically constant horsepower.

Western Mfg. Co., Detroit, Mich.

Circle number 51 on reader service card

Modular control centers

Bulletin PL6200, 16 pages, shows advantages and adaptability of a-c motor control centers and includes plan-it-yourself forms and instructions.

Clark Controller Co., Cleveland, Ohio.

Circle number 52 on reader service card

Miniature speed changers

Bulletin 96 describes new Series 2 miniature adjustable-ratio speed changers. Ratios continously adjustable over a 25:1 range (1:5 up to 5:1 down). Torques from 5 to 40 oz-in., speeds to 10,000 rpm; hp to 0.025. Choice of gearing type.

Metron Instrument Co., Denver, Colo.

Circle number 53 on reader service card

Worm gear reducers

Catalog 3305 covers single-reduction worm gear speed reducers with a high-load-capacity thread form and using high-strength materials; 32 pages.

De Laval Steam Turbine Co., Trenton, N. J.

Circle number 54 on reader service card

Gearing problems

Brochure presents typical gearing situations such as changing from spur to helical teeth without altering center distance; spur-helical drives; multiple-spline uses. Company's facilities are well outlined.

Adams Co., Dubuque, Iowa.

Circle number 55 on reader service card

Ball bearing units

Catalog 60, 24 pages, describes ball bearing units, including pillow blocks, flange units, and take-up units and frames, as well as commercial sealed ball bearings.

Roberts Mfg., Inc., Salina, Kan.

Circle number 56 on reader service card

TRIANGLE

SELF-ALIGNING
SLEEVE TYPE
BEARINGS

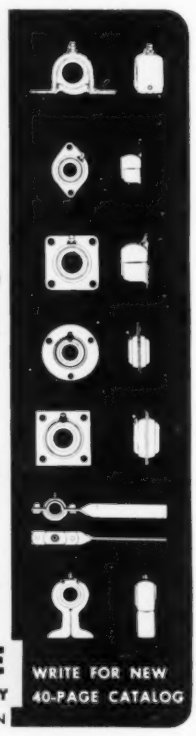
STANDARD▲
OR
◀SPECIAL

Routine or unusual — let us help with your bearing or bearing mounting problems. 20 years' experience furnishing new ideas and quality bearings at low cost to leading mechanical equipment manufacturers.

Creative design and engineering...

making our products better today . . . so yours may be better tomorrow.

TRIANGLE
MANUFACTURING COMPANY
734 DIVISION ST. • OSHKOSH, WISCONSIN

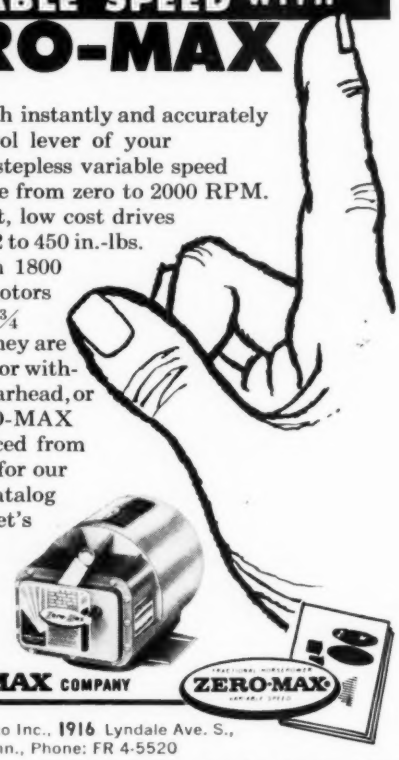


WRITE FOR NEW 40-PAGE CATALOG

For more information circle No. 20 on Reader Service Card

FINGERTIP CONTROL GIVES
VARIABLE SPEED WITH
ZERO-MAX

A finger's touch instantly and accurately sets the control lever of your ZERO-MAX stepless variable speed drive anywhere from zero to 2000 RPM. These compact, low cost drives produce from 2 to 450 in.-lbs. of torque with 1800 RPM input motors of from 1/8 to 3/4 horsepower. They are available with or without reverse, gearhead, or motors. ZERO-MAX drives are priced from $37.00. Write for our free 16-page catalog or refer to Sweet's Product Design File.



Representatives in major cities

THE ZERO-MAX COMPANY

Subsidiary of Revco Inc., 1916 Lyndale Ave. S., Minneapolis 5, Minn., Phone: FR 4-5520

For more information circle No. 23 on Reader Service Card

Bearing tester

Four-page folder describes the SmoothRator, an electronic tester that predicts performance qualities of oil-lubricated precision ball bearings up to 1-inch OD.

The Barden Corp., Danbury, Conn.

Circle number 57 on reader service card

Flexible shafting

Bulletin 570 has 12 pages of engineering data and typical applications for flexible shafting for power drives and remote control.

Stow Mfg. Co., Binghamton, N. Y.

Circle number 58 on reader service card

High-speed bearings

Catalog 359 details HJ series heavy-duty roller bearings with one-piece cage design that permits use at high speeds.

Torrington Co., Torrington, Conn.

Circle number 59 on reader service card

Heavy-duty reducers

High-horsepower speed reducers designed for cooling tower service are described in Bulletin 135-S.

The Cleveland Worm & Gear Co., Cleveland, Ohio.

Circle number 60 on reader service card

Adjustable-speed line

Bulletin GEA-6806, 16 pages in color, describes new ¼ to 25 hp line of Polydyne mechanical adjustable-speed drives. Principles of operation, configurations and features, mounting devices, rating tables, etc.

General Electric Co., Schenectady, N. Y.

Circle number 61 on reader service card

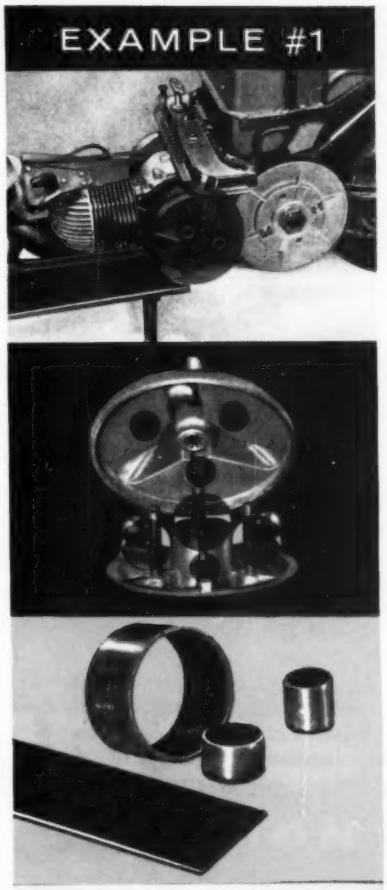
Gearmotors described

Technical information on horizontal and vertical mounted gearmotors, capacity to 125 hp, variety of output speeds from 780 to 1.2 rpm, in 32-page bulletin J-17. Included is handy load characteristics table for applications in various industries, with different types of equipment.

Hewitt-Robins, Inc., Stamford, Conn.

Circle number 62 on reader service card

Continued on page 60



DU dry bearings, used in the cover of the primary sheave (top), act as guide tracks and guide pin bushings (center), reduce friction and wear as centrifugal force moves ball bearings and guide pins in and out.

NEW GLACIER DU* DRY BEARINGS

greatly improve transmission design of Harley-Davidson "Topper"

Used at vital locations in the transmission assembly, DU dry bearings reduce friction and wear to the absolute minimum on the latest addition to Harley-Davidson's fine motor scooter line. DU dry bearings solve another problem, too—the accumulation of dirt and grime in the transmission lubrication. DU material requires no lubrication whatsoever, and will last many times longer than other dry bearings.

DU metal is an ideal bearing material. It withstands much higher velocities, runs much cooler at lower speeds than other unlubricated bearings . . . has a compressive strength of 51,000 p.s.i. DU metal is applied without the need for temperature-limiting adhesives . . . will withstand from −328°F to +536°F.

Apply DU material to appliances, automobiles, aircraft, farm and industrial machinery, office equipment. Standard bushings and thrust washers stocked for ⅜" to 2" shafts; strip available for special fabrication. Find out more from your bearing manufacturer, or write for engineering catalog DU-458. **Special Products Dept.**, United States Gasket Company, Plastics Division of The Garlock Packing Company, Camden 1, New Jersey.

GARLOCK

*Trademark, Glacier Metal Company Ltd.

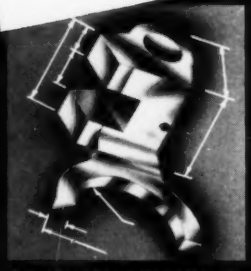
For more information circle No. 13 on Reader Service Card.

BUNTING® BEARINGS

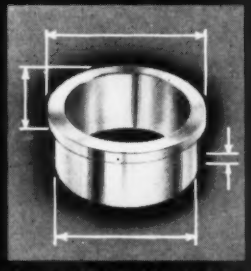
engineering for **both** cost and mechanical requirements in the bearing field . . .

Bunting can help you identify and procure the bearing or part that will do your job at the lowest possible cost. Often a re-examination of the actual mechanical needs of a bearing application reveals an opportunity to save money in design. Another saving is almost invariably achieved by considering ALL the new bearing materials which Bunting makes available to you today. Let Bunting help you engineer your bearing application in the light of modern availabilities. Send in your blueprints or ask for engineering counsel.

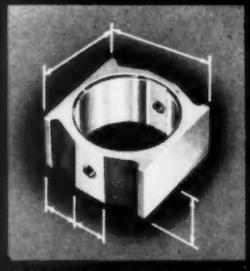
...case in point*



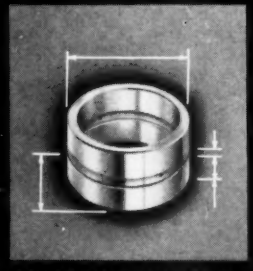
*Clearly evident is the economy in the production of this shifter fork by Bunting Powder Metallurgy. The elimination of machine work effects striking cost reduction.



*This cylinder gland bearing made of Bunting Bearing Aluminum is an example of how to save weight and money on the cost of large, thick-wall bearings and parts.



*This cast bronze cam block, made to unusually close limits with very fine finish, is absolutely round and true to size with cost at a feasible figure.



*Solid cast aluminum gear bearing to replace roller bearing for longer life and lower cost.

BUNTING ENGINEERS . . . Bunting maintains a staff of bearing engineers whose wide experience and specialized knowledge are available to you gratis for study and recommendation concerning your current or contemplated bearing applications.

Write for these:

NO. 158 • GENERAL CATALOG—Complete listings of Cast Bronze and Sintered Bronze Stock Bearings and Bars and Bunting Bearing Aluminum Bars. Pocket size edition.

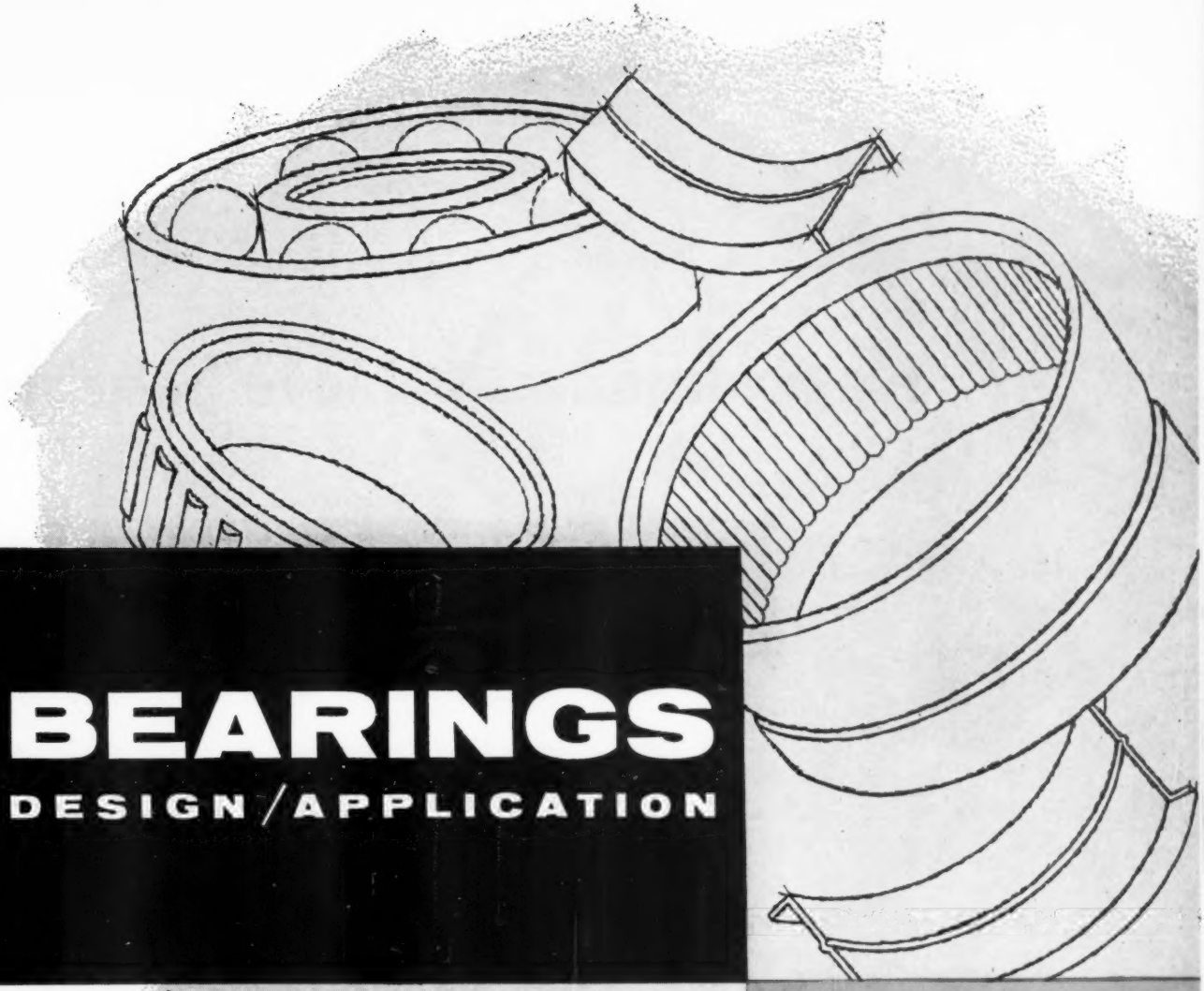
NO. 1 • • • ENGINEERING HANDBOOK OF POWDER METALLURGY—A comprehensive technical treatment of engineering and manufacturing of sintered metals, bearings and parts.

NO. 46 • TECHNOLOGY OF BUNTING BEARING ALUMINUM — A technical treatise on the composition of and machining Bunting Bearing Aluminum Bar Stock.

The BUNTING Brass and Bronze Company · Toledo 1, Ohio · Phone EVergreen 2-3451

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE, SINTERED METALS OR ALUMINUM ALLOYS

For more information circle No. 5 on Reader Service Card

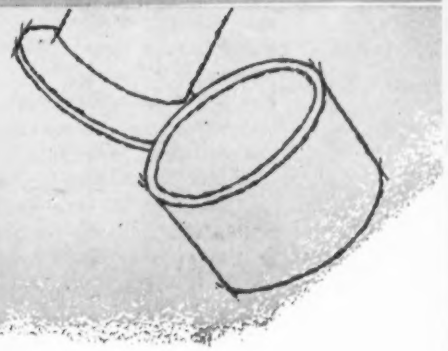


BEARINGS

DESIGN/APPLICATION

REGULAR MONTHLY SECTION OF IDEAS AND DEVELOPMENTS

POWER TRANSMISSION DESIGN



New aluminum sleeve bearings

ALUMINUM SLEEVE BEARINGS are used up to 35,000 rpm—and above. There are applications, now in experimental stage, operating above 50,000 rpm. Since lubrication becomes less critical as rpm increases, development is being undertaken around 100,000 rpm. Chief objective is to establish reliability at these speeds which cannot be guaranteed for most bearings.

Loads as high as 10,000 psi on the projected bearing area are being sustained in many heavy-duty engines. Loads as high as 12,000 psi are encountered in laboratory tests with thousands of operational hours with no signs of malfunction or great wear.

Present day practice, recommended by all manufacturers contacted, suggests these limits:

For reciprocating loads—5000 *psi with pressure lubrication*

For loads on rotary shafts—3000 *psi with pressure lubrication*

For loads on rotary shaft—1000 *psi with non-pressurized lubrication*

Three different alloys, SAE 770, SAE 780 and SAE 780-special modification are used, made from castings produced by sand or the permanent mold process. An experimental alloy with an "X" designation is also available from several manufacturers.

Strength characteristics are similar to those of babbitt and bronze. Cadmium-silicon-aluminum sheet alloys are also used in the manufacture of steel-backed aluminum bearings for the automotive field.

Castings of SAE 770 and SAE 780 are supplied either in T5 temper or stronger; T101 temper is attained by cold working the castings after heat treatment. This is usually accomplished in a mechanical or hydraulic press with plain flat dies which reduces the length of the casting by about 4 $\pm\frac{1}{4}$ per cent. Cold-working increases compressive yield strength and improves ability of the bearing to maintain an interference fit through cycles of heating and cooling while in a housing of lower expansion coefficient. Cold working *has very little influence on hardness.*

SAE 770 and SAE 780 have similar mechanical characteristics, but the latter is more adaptable to production of complicated parts. These parts, such as gear housings and pump bodies, may have both structural and bearing functions. Both are made with T5 temper when additional strength is not needed to withstand stresses and with T101 temper when additional strength is needed.

For the most intensively loaded parts, such as wrist pin bushings, tractor track roller bushings, connecting rods, etc., the higher strength SAE 780-special modification is used.

Load can be calculated on polar diagrams plotted as

For complete data on aluminum bearings, circle number 260 on Reader Service Card

—for high loads and speeds

maximum or average load. In either case, total load is divided by net projected area of the bearing half-shell. Result is an approximation of the arc of bearing loading.

Thickness

For engine bearings, the following formula is used to calculate wall thickness.

0.04 x bearing OD + 0.020 in. = wall thickness. Ample wall thickness lets bearing be fixed properly.

Fit

For full round bushing, difference between larger OD of the bushing and smaller ID of the housing is called interference fit. Since *modulus of elasticity of aluminum* is 10,000,000 psi, interference stress can be calculated. Recommendations for interference fit are normally expressed in inches per inch of bearing diameter. This figure multiplied by 10,000,000 gives stress; or stress can be established by remembering 0.001 in. of interference per inch of diameter is equivalent to 10,000 psi stress in the bearing.

For full round bushings, interference fits for SAE 770 and SAE 780 are from 0.0004 to 0.0006 in./in. of bearing OD.

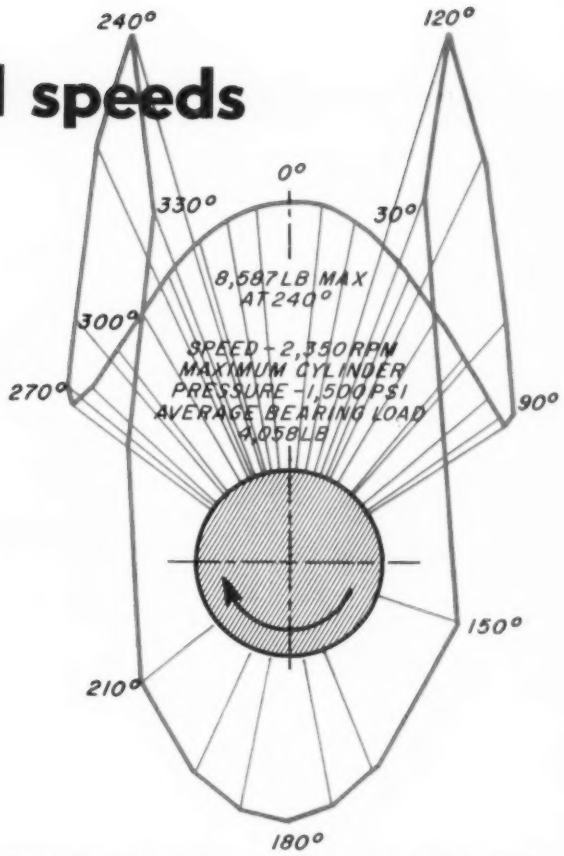
Thermal Expansion

With an aluminum alloy bearing in a ferrous housing, crush stress increases as engine temperature rises. Aluminum bearing alloys expand about twice the rate of ferrous metals.

Therefore, when interference fit must be maintained at room temperature, a limitation is placed on the bearing operating temperature.

If maximum operating temperatures are exceeded, the bearing may lose interference fit or crush when the engine cools down.

With proper selection of initial interference fit, solid



TYPICAL polar diagram of rotating shaft showing load distribution pattern.

PHYSICAL PROPERTIES OF CAST ALUMINUM BEARING ALLOYS

PROPERTY		SAE 770	SAE 780	SAE *780	EXPERIMENTAL ALLOY
SPECIFIC GRAVITY		2.88	2.83	2.88	2.78
WEIGHT, LB PER CU IN.		0.104	0.103	0.104	0.100
APPROXIMATE MELTING RANGE, °F		435-1,200	440-1,165	400-1,175	990-1,135
ELECTRICAL CONDUCTIVITY, % IACS		47	43	45	30
THERMAL CONDUCTIVITY, CGS UNITS		0.44	0.40	0.42	0.28
AVERAGE COEFFICIENT OF THERMAL EXPANSION, PER °F	-58 TO +68 °F	12.0	11.7	11.9	11.9
	68 TO 212 °F	13.0	12.6	12.9	12.6
	68 TO 392 °F	13.5	13.2	13.5	13.1

* WITH SPECIAL MODIFICATION

aluminum bearings, after having operated within maximum temperatures, will generally retain enough interference fit at room temperature.

Oil Clearance

With bearings of concentric bore or uniform wall thickness, oil clearance equivalent to 0.0015 in./in. of shaft diameter is recommended.

Because of stress concentration at the parting line, aluminum bearings are sometimes designed with *eccentric walls* to provide more clearance near the parting line. Where eccentric or taper wall bearings are used, oil clearance of 0.00175 in./in. of shaft diameter across the parting face is used with a clearance at right angles to the parting line face of 0.00125 in./in. of shaft diameter.

Where grease is used, clearance of 0.002 in./in. of shaft diameter is recommended.

In most bearing assemblies there is an absolute minimum clearance regardless of journal diameter which cannot be further reduced without risk of seizure.

Even though the *coefficient of linear expansion* of aluminum alloys is about twice that of iron or steel, there is very little change in oil clearance when going from room to operating temperature.

Length-To-Diameter Ratio

The trend has been to *reduce length-to-diameter ratios* although loads have increased. It is easier to maintain an oil film over a narrow area than over a wide area. As the bearing increases in length, uniform tolerances in machining and fit are difficult to maintain.

Therefore, it is best to limit the length of the bearing to an absolute minimum consistent with allowable bearing load.

All bearings should have a length-to-diameter ratio of less than 1. Because aluminum can support and sustain very high loads, it offers advantages for short bearing design. Short bearings permit shorter crankpins. A much stiffer shaft results.

TENSILE PROPERTIES OF CAST ALUMINUM BEARING ALLOYS AT ELEVATED TEMPERATURES

ALLOY AND TEMPER	HEATING TIME, HOURS	200°F			300°F		
		TENSILE STRENGTH, PSI	YIELD STRENGTH, PSI ①	ELONGATION IN 2 INCHES, PER CENT	TENSILE STRENGTH, PSI	YIELD STRENGTH, PSI ①	ELONGATION IN 2 INCHES, PER CENT
SAND CAST ALLOY SAE 770 (WITH T5 TEMPER)	1	18,000	11,000	5.0	16,000	11,000	5.0
	10	18,000	11,000	6.0	16,000	11,000	5.0
	100	19,000	11,000	6.0	16,000	12,000	5.0
	1,000	19,000	11,000	6.0	16,000	13,000	4.0
	10,000	19,000	14,000	3.0	16,000	14,000	3.0
SAND CAST ALLOY SAE 780 (WITH T5 TEMPER)	1	17,000	11,000	3.0	15,000	11,000	2.5
	10	17,000	11,000	3.0	15,000	11,000	2.5
	100	17,000	11,000	3.0	15,000	11,000	2.5
	1,000	18,000	12,000	2.5	15,000	11,000	2.5
	10,000	18,000	13,000	2.5	14,000	11,000	2.0
SAND CAST ALLOY (SPECIAL MODIFICATION OF SAE 780 WITH T5 TEMPER)	1	26,000	22,000	1.5	23,000	20,000	1.5
	10	26,000	22,000	1.0	23,000	20,000	1.5
	100	26,000	22,000	1.0	24,000	21,000	1.5
	1,000	26,000	22,000	1.0	24,000	22,000	1.5
	10,000	26,000	24,000	1.0	23,000	22,000	1.0
PERMANENT MOLD CAST ALLOY SAE 770 (WITH T5 TEMPER)	1	21,000	11,000	10.0	17,000	11,000	8.0
	10	21,000	11,000	10.0	17,000	11,000	7.0
	100	21,000	11,000	10.0	17,000	11,000	6.0
	1,000	21,000	11,000	9.0	17,000	13,000	6.0
	10,000	22,000	12,000	8.0	17,000	14,000	5.0
PERMANENT MOLD CAST ALLOY SAE 770 (WITH T101 TEMPER)	1	21,000	14,000	7.0	18,000	13,000	5.0
	10	21,000	14,000	6.0	18,000	13,000	5.0
	100	21,000	14,000	6.0	18,000	13,000	4.0
	1,000	21,000	14,000	6.0	18,000	13,000	4.0
	10,000	22,000	15,000	5.0	18,000	13,000	4.0
PERMANENT MOLD CAST ALLOY SAE 780 (WITH T5 TEMPER)	1	17,000	9,500	3.0	14,000	11,000	2.0
	10	17,000	11,000	3.0	14,000	11,000	2.0
	100	17,000	11,000	3.0	14,000	12,000	2.0
	1,000	17,000	11,000	2.5	14,000	12,000	2.5
	10,000	18,000	13,000	2.5	14,000	12,000	2.5
PERMANENT MOLD CAST ALLOY (SPECIAL MODIFICATION OF SAE 780 WITH T5 TEMPER)	1	30,000	22,000	3.0	26,000	22,000	2.0
	10	30,000	22,000	3.0	26,000	22,000	2.0
	100	30,000	22,000	3.0	26,000	23,000	2.0
	1,000	30,000	25,000	3.0	27,000	24,000	2.0
	10,000	31,000	25,000	2.5	27,000	24,000	2.0

① OFFSET EQUALS 0.2 PER CENT.

Grooving

Choice of grooving depends mainly on type and methods of lubrication. Multiple grooves may be used effectively with grease. Most diesel engines have a single-center circumferential oil groove or none at all. With solid aluminum bearings, the best practice is to use no groove. Because of aluminum's *high load-carrying capacity*, bearing width can be cut down sufficiently to insure proper flow.

Finish

Recommended finish for inside running surface of the bearing is between 16 *and* 25 *microinches rms*. It is more important to have an accurately machined surface, without drags or burnishing, than low microinch rms finish.

The surface of the housing bore and bearing back should be smooth—about 45 microinches rms maximum for the bore and 15 microinches rms maximum for bearing back. These low figures are advisable since, in operation, the bearing tends to embed itself into the valleys of the bore left by the finishing operation. This results in a decrease in crush stress.

A bright, shiny surface can be misleading because the metal may have been burnished and the peaks flattened down. Later, under load, the flattened peaks may release particles of material and damage the bearing surface. ▲▲▲

TYPICAL MECHANICAL PROPERTIES OF CAST ALUMINUM BEARING ALLOYS

ALLOY AND TEMPER	SAE 770 (T5 TEMPER)	SAE 780 (T5 TEMPER)	SPECIAL MODIFICATION OF SAE 780 (T5 TEMPER)	SAE 770 (T5 TEMPER)	SAE 780 (T5 TEMPER)	SPECIAL MODIFICATION OF SAE 780 (T5 TEMPER)	EXPERIMENTAL ALLOY
FORM	SAND CASTING	SAND CASTING	SAND CASTING	PERMANENT MOLD CASTING	PERMANENT MOLD CASTING	PERMANENT MOLD CASTING	DIE CASTING
TENSILE STRENGTH, PSI①	20,000	20,000	27,000	23,000	20,000	32,000	36,000
TENSILE YIELD STRENGTH① (OFFSET = 0.2%), PSI	11,000	11,000	22,000	11,000	11,000	23,000	20,000
ELONGATION, %① IN 2 INCHES	8.0	5.0	2.0	12.0	5.0	5.0	3.0
COMPRESSIVE YIELD② STRENGTH, (OFFSET = 0.2%), PSI	11,000	11,000	22,000	11,000	11,000	23,000	
BRINELL HARDNESS① 500 KG LOAD, 10 MM BALL	45	45	65	45	45	70	
SHEARING STRENGTH, PSI	14,000③	14,000③	18,000③	15,000	14,000③	21,000	
ENDURANCE LIMIT, PSI (R.R. MOORE TYPE SPECIMEN, 500,000,000 CYCLES)			10,000	9,000	9,000	11,000	

① TENSION AND HARDNESS VALUES DETERMINED FROM STANDARD HALF-INCH DIAMETER TENSILE TEST SPECIMENS CAST IN GREEN SAND MOLDS OR A PERMANENT MOLD AND QUARTER-INCH DIAMETER DIE CAST SPECIMENS. TENSION TESTS MADE WITHOUT MACHINING THE CAST SURFACE.

② COMPRESSION VALUES OBTAINED FROM HALF-INCH DIAMETER SPECIMENS WITH 1/R RATIO OF 6.

③ ESTIMATED VALUES.

THERMAL EXPANSION OF OTHER MATERIALS COMPARED TO ALUMINUM BEARING ALLOYS

MATERIAL	TYPE	AVERAGE COEFFICIENT OF THERMAL EXPANSION PER DEGREE FAHRENHEIT① TEMPERATURE RANGE, °F			
		0°F TO 100°F	0°F TO 200°F	0°F TO 300°F	0°F TO 400°F
ALUMINUM	HIGH PURITY	.0000123	.0000127	.0000130	.0000134
ALUMINUM	SAE 770 ALLOY	.0000122	.0000127	.0000130	.0000133
ALUMINUM	SAE 780 ALLOY	.0000119	.0000123	.0000126	.0000129
ALUMINUM	SPECIAL MODIFICATION OF SAE 780	.0000121	.0000125	.0000129	.0000133
TIN	PURE	.0000126	.0000129	.0000131	.0000133
BRONZE	78 CU-8 SN-14 PB	.0000097	.0000099	.0000101	.0000102
STEEL	SAE 1045	.0000060	.0000063	.0000066	.0000068
CAST IRON	SAE 120	.0000055	.0000057	.0000060	.0000062

① BASED ON UNIT OF LENGTH AT 0° F.

For complete data on aluminum bearings, circle number 260 on Reader Service Card

Announcing . . .

New Production Capacity

To Serve You Better

Large Generated Gears

SPUR—HERRINGBONE—HELICAL

for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears provide these results.

To meet increasing customer demands, Horsburgh & Scott has broadened its manufacturing capacity and tooled to produce *large* Generated Gears up to 125" diameter.

Offering the same high quality standards which characterize the complete H & S Gear line, production capacities for large Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

Up to 80" outside diameter at 1 DP
Up to 90" outside diameter at 1¼ DP
Up to 100" outside diameter at 1½ DP
Up to 125" outside diameter at 2 DP

Face widths up to 42", depending on helix angle.

Take advantage of this new capacity, and our long experience as specialists in this field. Send your specifications, drawings or plans — or tell us about your power transmission problem. Our technical staff will promptly consider your requirements and render recommendations and quotations.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue • Cleveland 14, Ohio

For more information circle No. 45 on Reader Service Card

LITERATURE

continued from page 53

Magnetic clutches

Technical booklet contains 18 pages of magnetic clutch design, applications, and technical and testing specifications.

PIC Design Corp., East Rockaway, N. Y.

Circle number 63 on reader service card

Curve crown pulley

Bulletin 558 has technical and engineering data, specifications, diagrams, and illustrations on the Curve Crown welded steel pulley.

Stephens-Adamson Mfg. Co., Aurora, Ill.

Circle number 64 on reader service card

Control system

Illustrated bulletin describes electronic control system known as K-2, applicable to company's Adjusto-Spede drives from 1 to 30 hp. K-2 maintains set speeds within plus or minus 2 percent of drives' maximum speeds, offers greater versatility and flexibility in production requirements and quality standards.

Eaton Mfg. Co., Dynamatic Div., Kenosha, Wisc.

Circle number 65 on reader service card

CLASSIFIED ADS

Rates: for "Positions Wanted" $8.00 minimum, limit 25 words. For all other classifications $10.00 minimum for 25 words; each additional word 25c. Boldface type or all caps, $12.00 minimum for 25 words, each additional word 35c. Box address counts as five words. All insertions payable in advance.

ENGINEER—MECHANICAL POWER TRANSMISSION

We can offer an excellent opportunity for advancement to an outstanding Mechanical Engineer in design and development of flexible couplings and other mechanical power transmission equipment. We want a man who has initiative, ideas and experience in this field.

Please write listing experience, education and present salary to:

A. W. Pomper, Director of Engineering
WALDRON-HARTIG
DIVISION OF MIDLAND-ROSS CORP.
P.O. Box 791 New Brunswick, N. J.

When the job calls for
"~~gearhead motor~~"

cost-wise designers specify

BOSTON Gear®
OPTIMOUNT®
HELICAL GEARED **RATIOMOTORS**

VERTICAL BASE MOUNTED OPTIMOUNT RATIOMOTOR drives agitator blade shaft on pigment mixers in coated textiles plant. Manufacturer says: "OPTIMOUNT adaptability permitted simplified, efficient design for our specific needs . . . at a much lower cost for the complete installation."

Add up the SAVINGS and see why . . .

YOU SAVE DESIGN TIME. Optional mounting gives full scope to your designing skill. Drive arrangements are not restricted by the mounting limitations of conventional gearhead motors.

YOU ELIMINATE EXTRA COST OF SPECIALS. With OPTIMOUNT Ratiomotors FROM STOCK, you can meet hundreds of unusual drive conditions that would require "specials" in conventional gearhead motors. You save the delay and extra cost.

YOU REDUCE PARTS COST. Since OPTIMOUNT offers a choice of many output shaft positions, you can design for direct lineup — and eliminate extra couplings, bearings, and other parts needed to "hook up" a conventional gearhead motor.

YOU SPEED PRODUCTION. Order the OPTIMOUNT you need with a phone call to your local Distributor, for delivery FROM STOCK. You can start production without delay, maintain schedules, and avoid big inventory expense.

YOU SIMPLIFY SERVICING. All OPTIMOUNT components are standardized stock parts — available promptly from over 100 BOSTON Gear Distributors throughout the U. S. and Canada.

Ask your BOSTON Gear Distributor for complete information. Boston Gear Works, 94 Hayward St., Quincy 71, Massachusetts.

Meet any in-line drive mounting conditions with STANDARD STOCK models

Vertical or horizontal base mounted — for any floor, wall, or ceiling mounting position — choice of many shaft positions in either base — single or double reduction helical gearing — for ¼ to 10 hp drives. Sold also without motor, ready for attachment of separately purchased motor of your choice.

Order from your nearby Distributor and get any arrangement you specify — ready to install

FROM STOCK!
at factory prices

Horizontal base mounted

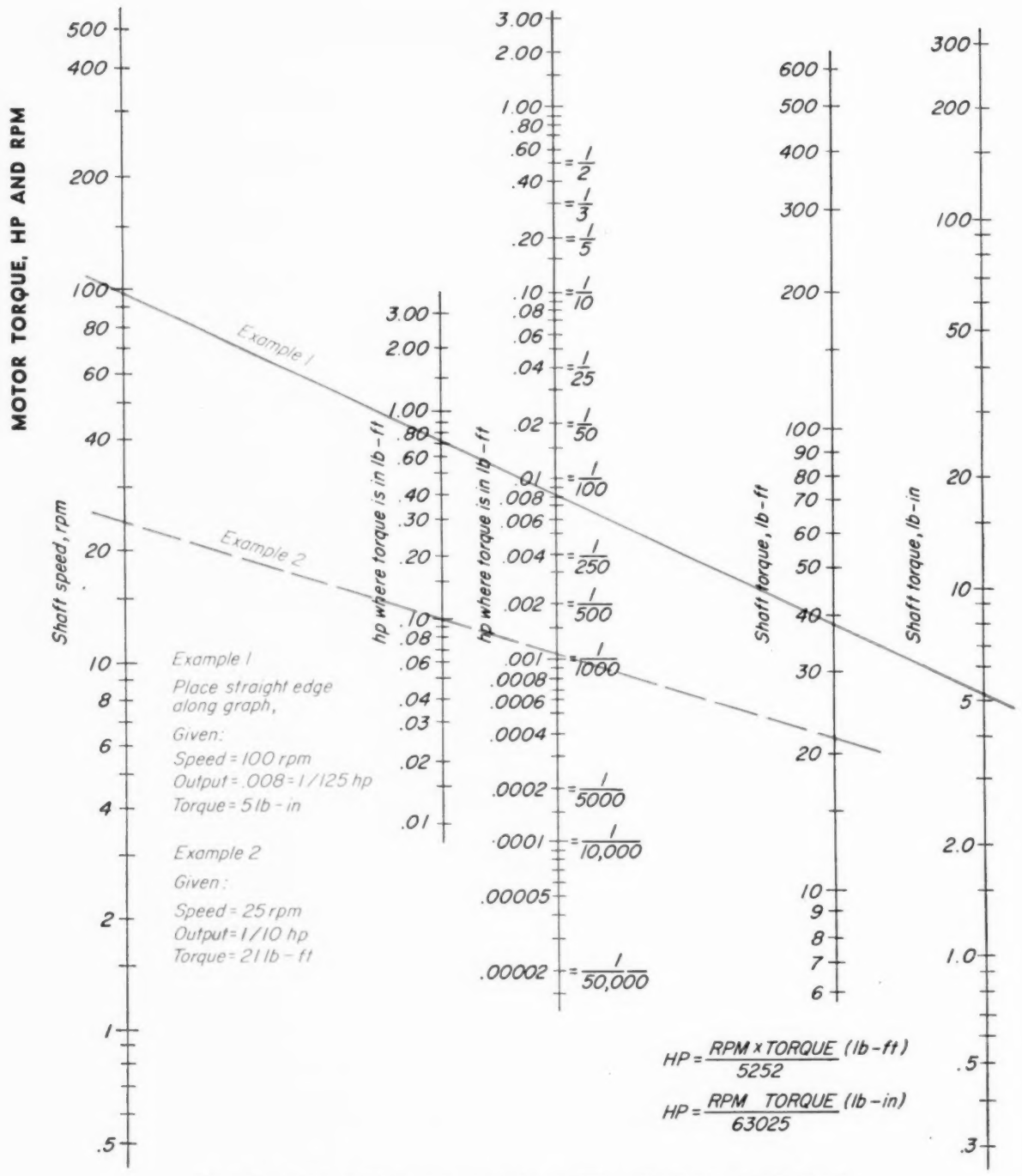
Ask for Catalog No. 57

CALL YOUR NEARBY
BOSTON Gear DISTRIBUTOR
— STANDARDIZATION PAYS —

Advt. copyright by Boston Gear Works

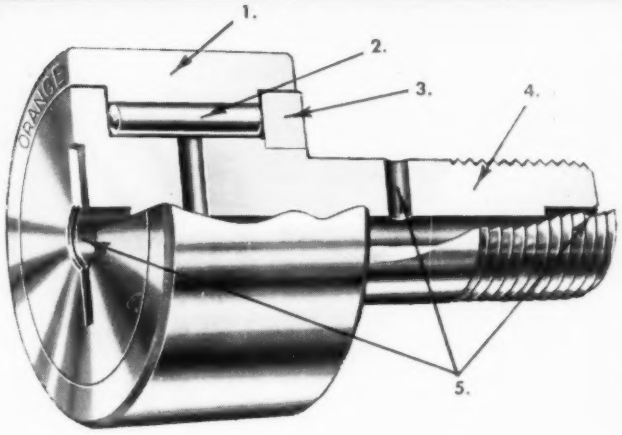
Nomogram of shaft torque, hp and rpm

Courtesy Merkle-Korff Gear Co.



For a free copy of this nomogram, circle no. 250 on the Reader Service Card

HIGH LOAD CAPACITY– HIGH SHOCK RESISTANCE– FOR CAM APPLICATIONS



1. Heavy-sectioned outer race is made of thru-hardened, precision-ground, high quality bearing steel.

2. Small diameter rolls are made of high grade bearing steel, electronically gauged for uniformity of size.

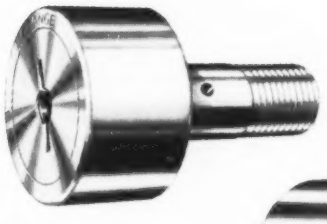
3. Case-hardened End Plate permits the use of effective press fit for retention.

4. Induction-hardened Stud assures maximum hardness of the roller track, with core toughness to withstand high shock loads. Slotted end for convenient screw driver mounting.

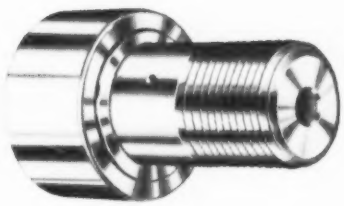
5. Selective Lubrication for design flexibility. Drilled for drive type fitting. Closing plugs also furnished.

ORANGE CAM FOLLOWERS

Every detail in the design and construction of Orange Cam Followers has been engineered to provide the maximum in precision, friction-free, durable service required by cam-activated mechanisms. Available in 22 standard sizes from ½" to 4" O. D., with either standard or heavy duty studs. Chrome, Cadmium or Black Oxide finishes can be supplied; also seals where conditions require.



TYPE S Standard Stud



TYPE H Heavy Duty Stud

Provides an average of 20% greater bending resistance of the stem where severe operating conditions exist, at no extra cost.

ORANGE CAM YOKE ROLLERS

Ideal for yoke mounting in all types of machinery involving cam action, or control of machine elements requiring guide or support rollers. Available in 18 sizes from ¾" to 4" O.D. and can be furnished with Chrome, Cadmium or Black Oxide finishes. Also supplied with seals where required.

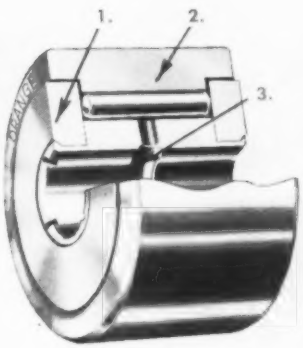
●

WRITE FOR 44-PAGE ENGINEERING REFERENCE MANUAL giving full specifications on Orange Cam Followers and Yoke Rollers, plus complete line of Orange Roller Bearings.

1. Staked End Plate. The inner race is zone hardened on the roller path for wear-resistance, while the ends remain more ductile to permit substantial staking for self-retention. Eliminates displacement caused by flimsy rings or insufficient deformation of thru-hardened inner races.

2. Heavy outer race thru-hardened to carry heavy loads.

3. Ample lubrication through center channel.



ORANGE ROLLER BEARINGS

ORANGE ROLLER BEARING CO., Inc.
552 Main Street, Orange, N. J.

Needle Bearings — Staggered Roller Bearings
Journal Roller Bearings — Thrust Roller Bearings
Cam Followers

For more information circle No. 17 on Reader Service Card

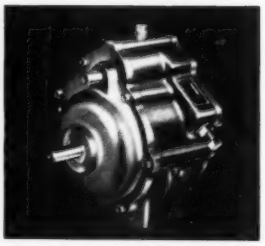
Now there are

3

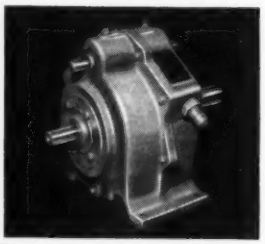
Versatile

S-N

REVERSING TRANSMISSIONS

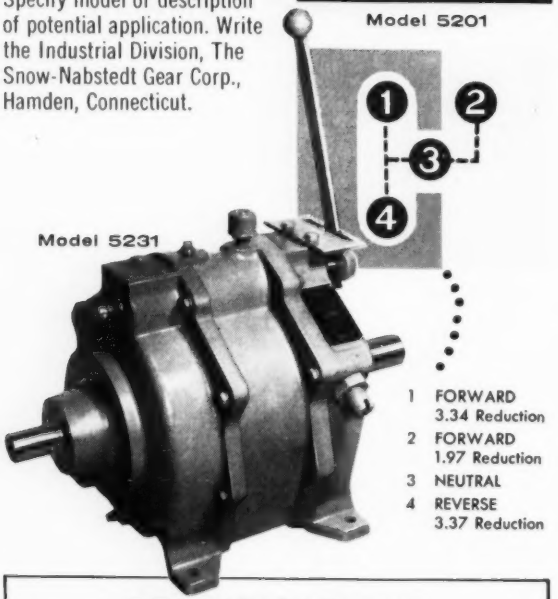


Model 5108



Model 5201

All designed to meet the demands for single, space saving units that reverse under full load. The newest, Model No. 5231, combines 2 speeds forward, neutral, reverse and reduction. Models 5201 and 5108 combine forward, neutral, reverse and reduction. All are performance proven. Technical literature is available. Specify model or description of potential application. Write the Industrial Division, The Snow-Nabstedt Gear Corp., Hamden, Connecticut.



Model 5231

1 FORWARD 3.34 Reduction
2 FORWARD 1.97 Reduction
3 NEUTRAL
4 REVERSE 3.37 Reduction

SPECIFICATIONS

MODEL NO.	5231	5201	5108
Reduction Forward	1.97:1 & 3.34:1	3.16:1	3.75:1
Ratio Reverse	3.37:1	3.16:1	3.75:1
Power Up To	28 HP	28 HP	8 HP
Maximum Input Torque	1000 in. lbs.	1000 in. lbs.	320 in. lbs.
Maximum Input Speed	2400 RPM	2400 RPM	2400 RPM
Dimensions Long	15 11/16"	11 1/2"	9 1/4"
Dimensions Wide	14"	12 1/2"	10"
Dimensions High	14 3/4"	14 3/4"	10 3/8"

SNOW-NABSTEDT

Transmission Engineers
FOR OVER HALF A CENTURY

For more information circle No. 37 on Reader Service Card

ADVERTISERS INDEX

Abart Gear & Machine Co. 34
Acme Chain Corp.
Airborne Accessories Corp.
Ajax Flexible Coupling Co.
Allied Manufacturing and Sales Co.
American Pulley Co.
Automatic Motor Base Co. 34
Automation Industries, Inc.

Bead Chain Manufacturing Co.
Bin-Dicator Co. 38
Charles Bond Co.
Borg-Warner Automotive Div., Borg-Warner Corp.
Boston Gear Works 61
Brad Foote Gear Works 8
Brammer Corp.
Brook Motor Corp. 36
Browning Mfg Co. 66
Bunting Brass and Bronze Co. 54

Carlyle Johnson Machine Co.
Centric Clutch Co.
J. D. Christian Engineers
Cincinnati Gear Co. 16
Climax Metal Products Co.
Cone-Drive Gears, Div. of Michigan Tool Co. 31
Control Industries, Inc.
Con-Vel Div., Dana Corp. 47
Conway Clutch Co.
Crichton Co.
Crofts U. S. A. Inc. 35
Crown Gear Co.
Cullman Wheel Co. 17
Curtis Universal Joint Co.
Curtiss-Wright Corp., Marquette Div.

Daido Corp.
Dayton Industrial Products Co. ..... 14 & 15
Dayton Rogers Mfg. Co. 36
De Laval Steam Turbine Co.
Diamond Chain Co. 19
R. & J. Dick Co.
Dodge Manufacturing Corp. 18
The duMont Corp.
Durkee-Atwood Co. 5

Eaton Automotive Gear Div.
Elliott Manufacturing Co.
Euclid Universal Machine, Inc.

Falk Corp.
Federal Gear and Seal Corp.
Ferguson Machine Corp. 2
Foote Bros. Gear and Machine Corp.
Formsprag Co.
Franklin Electric Co., Inc.
Funk Manufacturing Co. 38

Garlock Packing Co. 53
Gates Rubber Co.
Gear Grinding Machine Co.
Gear Specialties, Inc.
Gerbing Manufacturing Corp.
Goodyear Tire and Rubber Co. 3
Gray & Prior Machine Co.

Hewitt-Robins
Hi-Lo Manufacturing Co. 6
The Hilliard Corp.
Horsburgh & Scott Co. 60
Horton Manufacturing Co.

Illinois Gear & Machine Co.
Invo Spline, Inc.

D. O. James Gear Manufacturing Co.
Janette Electric Manufacturing Co.

Koppers Co., Inc.

Lovejoy Flexible Coupling Co. 10

Main Engineering & Machine Works, Inc.
Marlin Rockwell Corp.
Maurey Manufacturing Corp. 1
Mechanics Universal Joint Div.,
Borg-Warner Corp. ..... Cover II
Mercury Clutch Div.,
Automatic Steel Products, Inc.
Micro Precision Gear & Machine Corp. 51
Moline Malleable Iron Co. 13
Morse Chain Co., Div. of Borg-Warner Corp. 9

Ohio Carbon Co.
Ohio Gear Co.
Oil-Rite Corp.
Orange Roller Bearing Co., Inc. 63

Peerless Electric Co., Motor Div.
Perfection Gear Co., American Stock Gear Div.
PIC Design Corp.

Randall Graphite Bearings, Inc.
Raybestos-Manhattan, Inc.
J. E. Rhoades & Son
Roberts Manufacturing Co.
Rockford Clutch Div., Borg-Warner Corp. 37
Rockwell-Standard Corp.
Rockwell Pulley Manufacturing Co.

Salem Stamping &
Manufacturing Co. 36
Sealmaster Div.,
Stephens-Adamson Manufacturing Co.
Servospeed Div., Electro Devices, Inc. 11
Sier-Bath Gear & Pump Co.
Sierra Engineering Co.
Snow-Nabstedt Gear Corp. 64
Southwest Products Co.
Speed Selector Inc.
Stearns Electric Corp.
Stephens-Adamson Manufacturing Co.
Stow Manufacturing Co.

Thomas Flexible Coupling Co. 38
Tool Steel Gear & Pinion Co.
Torrington Co.
J. J. Tourek Manufacturing Co.
Triangle Mfg. Co. 52
Turner Transmission Inc.
Twin Disc Clutch Co. 49

United Bearing Co.
U. S. Electrical Motors
U. S. Rubber Co. 7

V-Belt Clutch Co.
Vickers Inc., Electric Products Div.

John Waldron Corp.
Warner Electric Brake & Clutch Co. ..... Cover III
T. B. Wood's Sons Co. 32, 33
Worthington Corp.

Zero-Max Co. 52

Circle Reader Service Card from this list for New Product information or Literature

NEW PRODUCTS

start on page 30 — *Circle no.*

Dual torque-locking and positioning device **200**
Formsprag Co.

Helical speed reducers **201**
Philadelphia Gear Corp.

Adjustable speed drives **202**
General Electric Co.

New bearing mounts **203**
Bronze Bearings, Inc.

Tiny universals **204**
Falcon Machine & Tool Co., Inc.

Bushed coupling **205**
Ajax Flexible Coupling Co., Inc.

Variable-pitch pulley **206**
Congress Drives Div., Tann Corp.

Precision drive units **207**
Acton Laboratories, Inc.

No-freeze sheave **208**
T. B. Wood's Sons Co.

Pillow blocks **209**
Link-Belt Co.

Bevel gears **210**
Braun Gear Co.

Multi-speed chart drive **211**
Insco Co., Div. of Barry Controls Inc.

Fin/fan cooled reducers **212**
The Ohio Gear Co.

Sealed roller bearing **213**
Rollway Bearing Co., Inc.

Packaged drive system **214**
Reeves Pulley Div., Reliance Electric and Engineering Co.

New motor design **218**
Carter Motor Co.

Bevel gear boxes **219**
PIC Design Corp.

Size E motoreducer **220**
The Falk Corp.

Hermetic shaft seal **221**
Co-Engineering Co.

No-lubrication bearing **222**
Radial Bearing Corp.

LITERATURE

start on page 50 — *Circle no.*

Shaft motion indicator **2**
Bin-Dicator Co.

AC motors **4**
Brook Motor Corp.

Bearings **5**
Bunting Brass and Bronze Co.

Custom-made gears **6**
Cincinnati Gear Co.

Speed reducers **7**
Crofts U.S.A.

Roller chain, sprockets **8**
Diamond Chain Co., Inc.

V-belts **9**
Durkee-Atwood Co.

Shaft-mounted speed reducers **11**
Dodge Mfg. Corp.

Transmission equipment **14**
Lovejoy Flexible Coupling Co.

Chain manual **16**
Moline Malleable Iron Co.

GEARBELT DRIVES

GEARBELT ADVANTAGES:

- **A POSITIVE DRIVE.** No slip, creep or backlash.
- **STEEL CABLE** strength member will not stretch, needs minimum take-up.
- **FREEDOM** from high initial belt tension. Reduces bearing loads, increases life.
- **COMPACT.** Gearbelts permit smaller pulleys, shorter centers, narrower belts.
- **LIGHTWEIGHT.** High horsepower-to-weight ratio.
- **LESS NOISE.** No vibration, no chatter.
- **LESS HEAT** because virtually no friction.
- **SPLIT TAPER BUSHING** grips pulley on shaft with vise-like pressure. Quick, easy mounting and removal.

Here is a versatile new drive that provides high mechanical efficiency *plus* the inherent flexibility of belts. Browning Gearbelts engage matching pulleys with the positive action of gears, yet without their disadvantages. They eliminate metal-to-metal contact, lubrication, vibration, chatter. Require minimum maintenance.

Browning Gearbelt Drives provide cost-saving advantages in scores of applications, particularly those which require high capacity in limited space, or freedom from stretch and take-up. Ask your Browning distributor for complete information, or write us for Catalog GB-201.

Browning Manufacturing Company
Maysville, Kentucky

Browning **POWER TRANSMISSION EQUIPMENT**

V-DRIVES • CHAIN DRIVES • COUPLINGS • PAPER PULLEYS • BEARING UNITS

For more information circle No. 25 on Reader Service Card

Roller bearings 17
Orange Roller Bearing Co., Inc.

Steel pulleys 18
Salem Stamping & Mfg. Co., Inc.

Motor speed control 19
Servospeed Div., Electro Devices, Inc.

Self-aligning bearings 20
Triangle Mfg. Co.

Clutches, fluid drives 21
Twin Disc Clutch Co.

Variable speed drive 23
Zero-Max Co.

Toothed belt drive 25
Browning Mfg. Co.

V-drives 26
Maurey Mfg. Corp.

Cut-to-order gears 28
Abart Gear and Machine Co.

Clutches, power take-offs 29
Rockford Clutch Div.,
Borg-Warner Corp.

Constant velocity joints 30
Con-Vel Div., Dana Corp.

Flexible couplings 31
Thomas Flexible Coupling Co.

V-belt drives 34
Dayton Industrial Products Co.

Universal joints, drives 50
Neapco Products, Inc.

Transmission 51
Western Mfg. Co.

Modular control centers 52
Clark Controller Co.

Miniature speed changers 53
Metron Instrument Co.

Worm gear reducers 54
De Laval Steam Turbine Co.

Gearing problems 55
Adams Co.

Ball bearing units 56
Roberts Mfg., Inc.

Bearing tester 57
The Barden Corp.

Flexible shafting 58
Stow Mfg. Co.

High-speed bearings 59
Torrington Co.

Heavy-duty reducers 60
The Cleveland Worm & Gear Co.

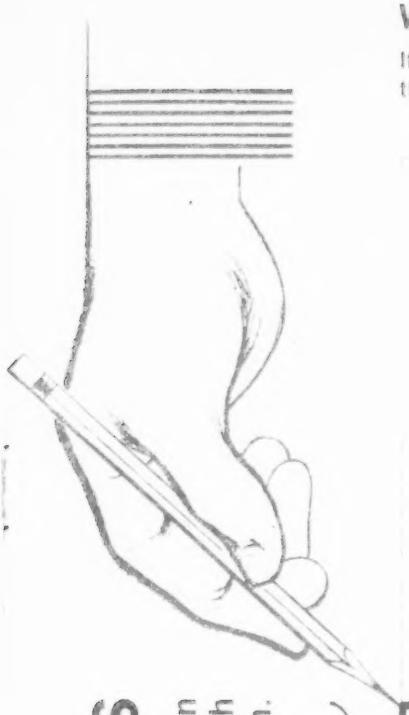
Adjustable-speed line 61
General Electric Co.

Gearmotors described 62
Hewitt-Robins, Inc.

Magnetic clutches 63
PIC Design Corp.

Curve crown pulley 64
Stephens-Adamson Mfg. Co.

Control system 65
Eaton Mfg. Co., Dynamatic Div.



Facts At Your Fingertips

If you want details about products described or advertised in this issue, circle the number on the card that corresponds with the number under each advertisement or product description.

Power Transmission Design

Was this copy correctly addressed?

If not, use this card to give us your complete mailing address plus the old (incorrect) one

PTD is now addressed like this:

It should be changed to this:

Products manufactured (or other business carried on) at this address

My job title

Signature

PLEASE PRINT

JANUARY 1960, DO NOT USE AFTER 4-15-60

Name

Position

Company

Kind of Business

Street

City

Zone State

Please send me additional information and literature on items circled below.

1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273	289	305	321
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274	290	306	322
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275	291	307	323
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276	292	308	324
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277	293	309	325
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278	294	310	326
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279	295	311	327
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280	296	312	328
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281	297	313	329
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282	298	314	330
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283	299	315	331
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284	300	316	332
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285	301	317	333
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286	302	318	334
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287	303	319	335
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336

Please send free tear sheet of pages

PLEASE PRINT

JANUARY 1960, DO NOT USE AFTER 4-15-60

Name

Position

Company

Kind of Business

Street

City

Zone State

Please send me additional information and literature on items circled below.

1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273	289	305	321
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274	290	306	322
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275	291	307	323
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276	292	308	324
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277	293	309	325
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278	294	310	326
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279	295	311	327
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280	296	312	328
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281	297	313	329
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282	298	314	330
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283	299	315	331
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284	300	316	332
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285	301	317	333
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286	302	318	334
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287	303	319	335
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336

Please send free tear sheet of pages

Facts at your fingertips

FIRST CLASS
PERMIT No. 8066
CLEVELAND, OHIO

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY: *Reader Service Department*

Power Transmission Design
812 Huron Road
Cleveland 15, Ohio

FIRST CLASS
PERMIT No. 8066
CLEVELAND, OHIO

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY: *Reader Service Department*

Power Transmission Design
812 Huron Road
Cleveland 15, Ohio

FIRST CLASS
PERMIT No. 8066
CLEVELAND, OHIO

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY: *Reader Service Department*

Power Transmission Design
812 Huron Road
Cleveland 15, Ohio

FACTS at your fingertips

The most modern Reader Service Department in the publishing industry, staffed and trained to help readers. Automatic equipment processes your requests and shoots them on for fulfillment within hours after receipt. The materials you want get to you — fast.

These cards are your tickets to this prompt service. Use them to secure details about any item in this issue that has a key number. For instance:

ADVERTISEMENTS—a showcase of the latest in components, equipment and techniques.

NEW PRODUCTS—brief descriptions of significant new products and materials.

PRODUCT APPLICATIONS—brief reports on successful applications of recently developed products and materials.

NEW LITERATURE—offerings of new catalogs, data books, price lists, and other valuable reference material.

electric motion control facts

for IDEA MEN

Converting to electric brakes and clutches can increase productivity without capital outlay

Many machines in use today can be made more profitable by the installation of Warner electric brakes and/or clutches and controls.

Often this is because cycle rates can be increased. Many times, improvement stems entirely from increased controllability. Frequently, it is a combination of the two.

The important point is, productivity improvement through power drive modernization can be extremely profitable. For this is one of the few real opportunities to upgrade capital equipment without depleting capital.

A good example is this wire-stitching machine. Replacement of a mechanical clutch and brake with a Warner electric clutch-brake increased productivity 50%. Cost of the complete conversion (elements of which are shown in Fig. 2) amounted to $2300.

Strictly from an operating standpoint, how long do you think it will take to pay for this expenditure out of a 50% productivity increase? Probably not even a year at today's labor rates. Actually, maintenance savings ($358 per month) will pay for the improvement *in less than seven months.*

Unfortunately, modernization is not always as easy as installing a Warner Electro-Sheave on a motor shaft. Here, the main drive shaft had to be extended and supported at the outer end in a live bearing. The brake magnet was stationary-mounted to the inner support frame. And the brake armature was through-shaft mounted on drive pins which screw into the back of the clutch magnet-mounting hub. The hub, itself, is keyed to the drive shaft—so positive braking is provided after declutching. This eliminates coasting and permits extra-fast cycle rates.

The electric clutch also is through-shaft mounted—the magnet by setscrews in the opposite face of the hub carrying the brake armature. The clutch armature is mounted on drive pins to the pulley. The pulley is bearing-mounted to the drive shaft. Thus, when the clutch is engaged, the main drive shaft is coupled to the motor. When it is disengaged, a relay in the control circuit actuates the brake, stopping the drive shaft instantly. The motor continues to operate, with the pulley running under no load.

A standard Warner control unit operates the clutch-brake. Switch life has been increased because the 20 amp a-c solenoids, formerly switched directly, are now actuated by relays. A microswitch for automatic clutch release and a pushbutton station for brake release complete the conversion.

Cycle time of the new drive is 436 stitches per minute—50% faster than the previous rate.

It will pay you to make power drive modernization a regular part of your product improvement or machine maintenance programs.

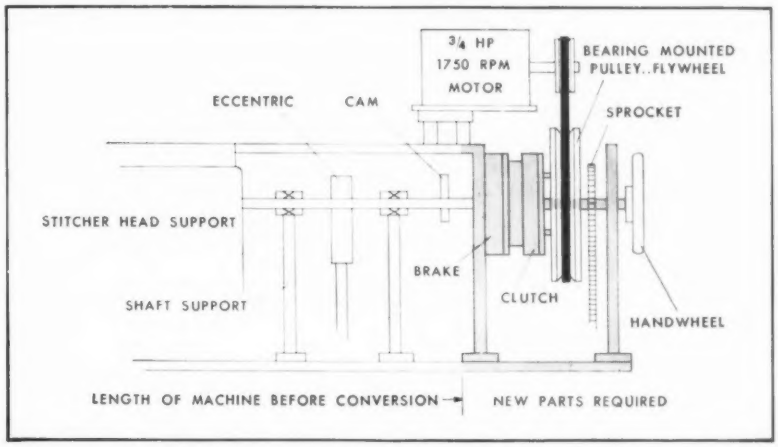
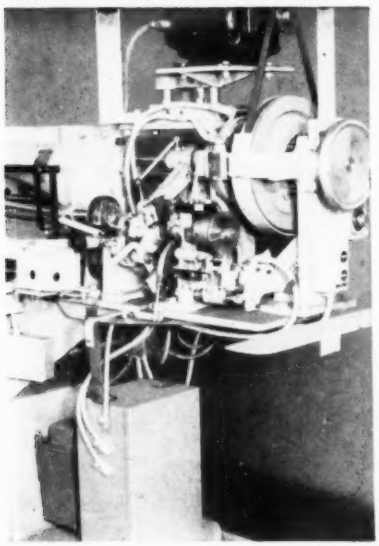


Fig. 2—Constant-running drive motor powers free-running sheave mounted to clutch armature. Clutch-brake cycles main drive 436 times a minute.

Fig. 1—Drive end of the wire-stitching machine equipped with Warner electric clutch-brake.



Originators of electric motion control

Warner Electric Brake & Clutch Co.

Dept. PTD, Beloit, Wisconsin

Gentlemen: Please send complete information about Warner electric brakes and clutches.

Name_____ Title_____

Company_____

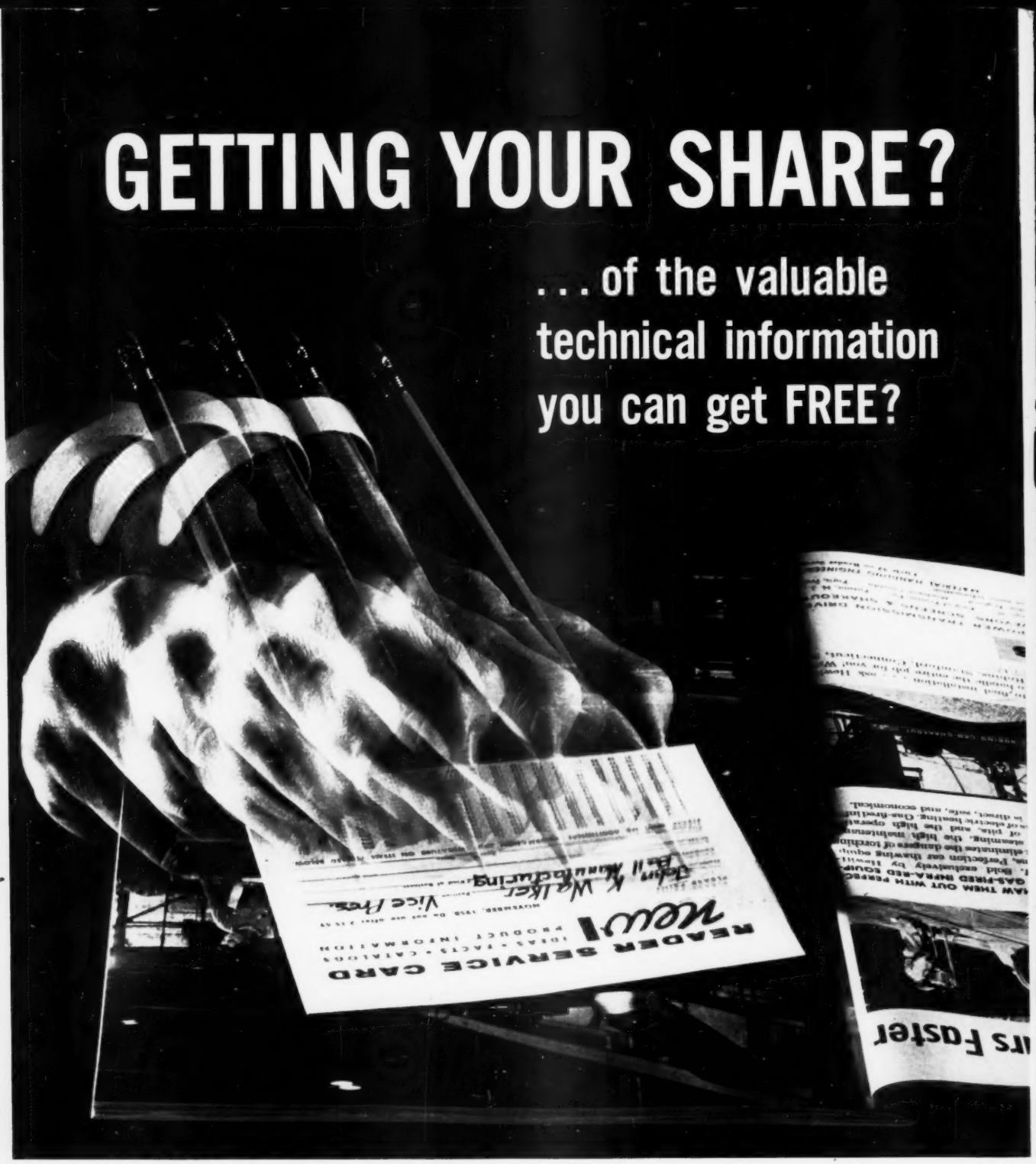
Address_____

City_____ Zone____ State_____

For more information circle No. 22 on Reader Service Card

GETTING YOUR SHARE?

. . . of the valuable technical information you can get FREE?



Every issue of POWER TRANSMISSION DESIGN offers a gold mine of design product, application and industry information. Product facts, catalogs, data books, manuals: the latest facts for your engineering and purchasing files are yours for the asking. The easy way to ask is to use one of the Reader Service Cards bound into this issue.

POWER TRANSMISSION DESIGN

Published by Power Publishing Company, Inc. Subsidiary of The Industrial Publishing Corporation
812 HURON ROAD CLEVELAND 15, OHIO SUperior 1-9620
SALES OFFICES: NEW YORK • CHICAGO • LOS ANGELES • LONDON, ENGLAND

Franchise Circulation gets magazines to the men who buy

Distilled Writing gets magazines read